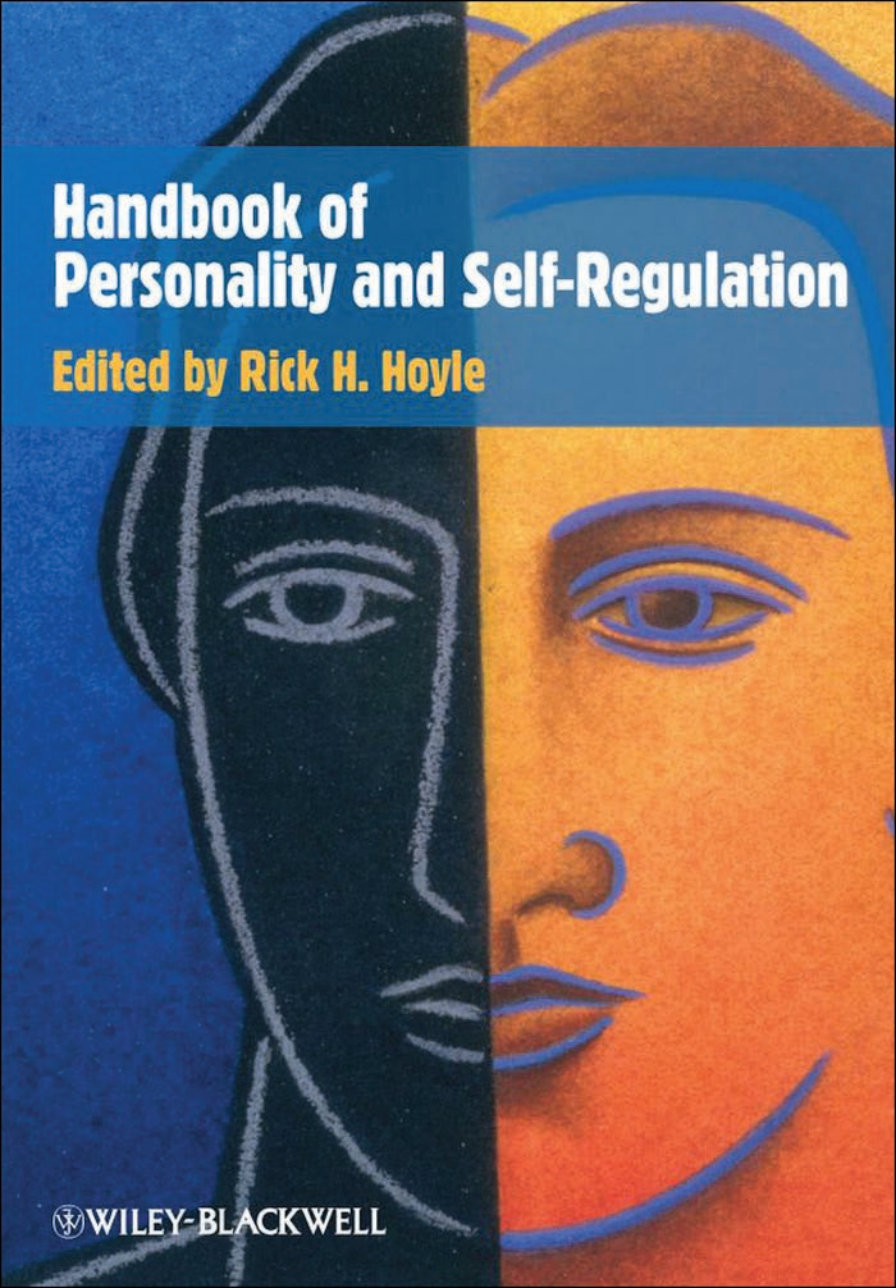
# Handbook of Personality and Self-Regulation

Edited by Rick H. Hoyle



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Handbook of Personality and Self-Regulation

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Edited by

**Rick H. Hoyle**

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# *Preface*

It is perhaps not surprising that self-regulation and related constructs began moving toward center stage in psychological science in the 1990s. The increased attention coincided with emerging evidence that Americans were beginning to realize the consequences of the excesses of the 1980s. For instance, US consumers' revolving credit debt, which stood at $54 billion in the late 1970s, had risen to more than $600 billion by the end of the 1990s; it now approaches $1 trillion. Whereas in 1990 no US state had a prevalence rate above 15% for obesity, by 2007 only one state had a prevalence rate less than 20%, and 30 states had a prevalence rate of 25% or more. The Centers for Disease Control and Prevention reported that in 2000, obesity, physical inactivity, and tobacco use accounted for more than one-third of all deaths in the US. Another 8% of deaths were attributable to a cluster of behavioral causes—alcohol consumption, motor vehicle crashes, incidents involving firearms, sexual behaviors, and use of illicit drugs—principally characterized by inadequate self-regulation. As this book is going to press, millions of Americans are reeling in the face of an economic crisis attributable in part to excessive borrowing and lending and high-risk investments made with little or no concern for potential long-term consequences. As the costs of these unregulated behaviors mount, psychological scientists have reacted by drawing attention to the causes and consequences of inadequate self-regulation and means by which self-regulation might be improved.

The goal of this handbook is to showcase some of the best psychological science on self-regulation, with a specific focus on programs of research that examine self-regulation in the context of normal personality. Each chapter integrates empirical findings on one or more basic personality traits with findings inspired by emerging models of self-regulation. The focus is *programs* of research; thus, each chapter reviews multiple research studies, sometimes carried out over decades, by the authors. Although

findings from most of these studies have been published previously, their value is increased through inclusion in integrative accounts that focus on themes across multiple studies and perhaps highlight implications of the findings that were not apparent when originally published.

The primary audience for the book is social and behavioral scientists with an interest in dynamic models of personality and self-regulation. Many of the chapters present findings from research conducted in settings or with populations that are of potential value to practitioners (e.g., counseling and clinical psychologists, psychiatric social workers, financial advisors) who serve individuals who could benefit from more effective self-regulation. Because of the relevance of self-regulation to discussions of the broader, more philosophical question of how a society regulates the behavior of its members, this handbook might also be of interest to some sociologists, economists, political scientists, and philosophers.

A subset of the chapters in this handbook began as articles in a special issue of *Journal of Personality* on personality and self-regulation (Volume 74, Issue 6, December 2006). The number and length of contributions in that outlet were necessarily restricted. It became apparent early in the process of editing that special issue that there were more contributors than an issue of the journal could accommodate, and that contributors had more to say than page limits would allow. A subset of the authors whose contribution initially appeared in that special issue were invited to expand and update their journal article to be included as a chapter in this handbook. To this core set of contributions were added chapters that address temperament, as well as chapters that extend the range of personality traits and individual differences represented in the special issue of *Journal of Personality*.

This handbook is organized in three parts. In Part I, the chapters focus on the emergence of aspects of temperament and personality relevant to self-regulation. Chapters in Part II provide accounts of self-regulation as it influences and is influenced by basic personality processes in normal adults. Part III is the largest, comprising 10 of the 21 chapters. Chapters in this part focus on individual differences that contribute to or reflect variability in the components, styles, and effectiveness of self-regulation. Collectively, these contributions offer a rich account of the state of the science in research on personality and self-regulation.

## Acknowledgments

Producing a book, even one for which the bulk of the content is provided by talented contributing authors, is a substantial undertaking and is rarely accomplished without the support of talented professionals. This handbook is no exception. I owe a debt of gratitude to Howard Tennen (University of Connecticut), long-time editor of *Journal of Personality*, who supported my guest editorship of a special issue of that journal on personality and self-regulation and encouraged me to expand that set of journal

articles into this handbook. Christine Cardone, executive editor of psychology books for Wiley-Blackwell, facilitated the transition from journal to handbook editor and offered guidance and encouragement from beginning to end. Grazyna Kochanska (University of Iowa) helped identify potential contributors for the first section of the book. The structure and content of the book benefit from input at the proposal stage from Brent Roberts (University of Illinois), Constantine Sedikides (University of Southampton), James Shepperd (University of Florida), and Howard Tennen (University of Connecticut Health Center). Contributing authors helped strengthen the book as a whole by reviewing and providing feedback on drafts of other contributors' chapters. Constance Adler, editorial assistant for Wiley-Blackwell, helped move the manuscript through the publication process. Finally, as with all my projects, scholarly and otherwise, I benefited from the encouragement and support of my wife, Lydia, and my children, Matthew, Michael, and Jessica.

Rick H. Hoyle
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# 1

# *Personality and Self-Regulation*

**Rick H. Hoyle***

Because people are not in complete control of the physical and social environments they encounter in daily life, it is inevitable that discrepancies arise between what their identities, goals, and preferences lead them to expect or desire in specific situations and what transpires in those situations. People generally find such discrepancies at least mildly and temporarily unsettling, because they call into question their understanding of how the world works (or could work) or their understanding of their own goals, motives, or behavior. When these discrepancies arise, they generally are met with swift and decisive actions aimed at aligning expectations or desires and reality. These actions, collectively referred to as self-regulation, are the natural, often automatic response of healthy individuals to salient discrepancies between expectation and reality as they perceive it. They may involve cognition or behavior, and almost always are attended by affect.

Effective self-regulation is the bedrock of healthy psychological functioning. People who routinely are successful at self-regulation benefit from a sense of psychological stability and personal control that allows them to manage their perceptions of themselves and how they are perceived by others. Their behavior typically reflects salient goals and adopted standards of behavior. Departures from these desired states are handled smoothly and effectively. People who routinely fail at self-regulation enjoy none of the psychological benefits that derive from a sense of psychological stability and control and struggle with mild to severe forms of psychopathology. Effective self-regulation, by which people control their thoughts, feelings, and behaviors, is essential for adaptive functioning.

The recognition that self-regulation is of central importance in adaptive functioning has inspired a large literature on the antecedents, correlates, and consequences of

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effective and ineffective self-regulation. Contributors to this literature represent the full range of subdisciplines within psychological science as well as other disciplines concerned with human behavior (e.g., sociology, education). In the psychological sciences, different perspectives and streams of research on self-regulation have been showcased in a number of edited volumes published within the last decade (e.g., Baumeister & Vohs, 2004; Boekaerts, Pintrich, & Zeidner, 2000; Cameron & Leventhal, 2003; de Ridder & de Wit, 2006; Heckhausen & Dweck, 1998).

Despite the impressive size and breadth of the literature on self-regulation in psychological science and related disciplines, relatively little research or theorizing (especially in the adult literature) has targeted the intersection of self-regulation and personality processes. As such, research on personality structure and process rarely reflects the rich detail of models of self-regulatory processes, and research on the self-regulatory processes rarely addresses the fact that some portion of those processes is a reflection of stable tendencies of individuals. The primary aim of this handbook is to bridge the personality and process-oriented literatures on self-regulation by showcasing programs of research that draw from and speak to both perspectives.

In this opening chapter, I begin by discussing personality and information-processing perspectives on self-regulation. Next, I describe ways in which the personality and information-processing perspectives might be integrated. These range from methodological approaches, in which constructs representing the two perspectives are examined through integrated data-analytic strategies, to conceptual approaches, in which the two perspectives are unified in a holistic theoretical model of self-regulation. In the final section of the chapter, I preview the individual contributions that constitute the remainder of the handbook, which is organized in three conceptually coherent but overlapping parts: the emergence and early expression of variability in self-regulation; self-regulation as a process that plays out in the context of normal adult personality; and individual differences in the components, styles, and effectiveness of self-regulation.

## Temperament and Personality Perspectives

The characteristic means by which people self-regulate and the routine success or failure they experience are reflected in personality traits. Many of these traits are rooted in temperament, which manifests early in life. Despite the obvious continuity between temperament and personality, the literatures on these two manifestations of personhood are relatively distinct; thus, they are summarized separately in this section.

### *Temperament Constructs*

The basic elements of the self-system and the capacity to self-regulate begin to emerge early in life. For example, variation in the ability to inhibit behavior stabilizes

by about one year of age (Kagan, 1997). The ego—the psychological structure and processes through which people relate to their social and physical environment—undergoes differentiation and change as young children mature (Loevinger, 1976). In terms of self-regulation, the developing individual becomes increasingly more able to delay gratification and increasingly less prone to act impulsively or in response to external pressure (Hy & Loevinger, 1996). With the emergence of self-awareness and internalized standards of behavior comes the capacity to self-regulate.

A temperament construct with clear implications for self-regulation is effortful control, defined as the "ability to inhibit a dominant response to perform a subdominant response, to detect errors, and to engage in planning" (Rothbart & Rueda, 2005, p. 169). Although specific constructs and labels vary across models of temperament, most include two broad factors that reflect the tendency toward a dominant response of approach or avoidance. Through the exercise of effortful control, children are able to inhibit these dominant responses when they would conflict with an activity in which they are engaged. Individual differences in effortful control begin to emerge by two years of age and by four years of age are temporally stable (Kochanska, Murray, & Harlan, 2000). Effortful control is a precursor to the constraint dimension in adult models of personality.

A related temperament construct is behavioral inhibition, which focuses on variation in children's reactions to unfamiliar or unexpected stimuli. In the presence of such stimuli, children as young as one year of age who are behaviorally inhibited exhibit stress and behavioral restraint. The neurophysiology of behavioral inhibition indicates overactivity in brain regions associated with fear (Fox, Henderson, Marshall, Nichols, & Ghera, 2005). Thus behaviorally inhibited children are faced with the regulatory challenge of managing fear and anxiety in the face of the unexpected. Because a stimulus for self-regulation is unexpected feedback from the environment (Duval & Wicklund, 1972), behaviorally inhibited individuals face the challenge of managing such feedback while also managing the fear and anxiety such stimuli invoke.

These and other temperament constructs influence the emergence and development of self-regulation and underlie personality traits relevant to adult self-regulation. Although a large number of personality traits have some relevance for adult self-regulation, those that follow most clearly from temperament and are most likely to appear in major models of personality can be grouped under the general headings of conscientiousness and impulsivity.

### *Conscientiousness and Related Constructs*

Among the higher-order dimensions of personality, conscientiousness is the most clearly relevant for self-regulation. Although defined somewhat differently in lexical and psychometric models, conscientiousness generally concerns the ways in which people characteristically manage their behavior. People who are high on conscientiousness

are confident, disciplined, orderly, and planful, whereas people who are low on conscientiousness are not confident in their ability to control their behavior, and are spontaneous, distractible, and prone to procrastinate (Costa & McCrae, 1992). In research linking conscientiousness to behavior, the more narrowly focused facets underlying the domain are emphasized (Paunonen & Ashton, 2001). The facets—competence/self-efficacy, orderliness, dutifulness, achievement striving, self-discipline, and deliberation/cautiousness—reflect different behavioral tendencies characteristic of successful self-regulation (Roberts, Chernyshenko, Stark, & Goldberg, 2005).

A related higher-order dimension of personality is constraint, which reflects well the temperament trait of behavioral inhibition (Tellegen, 1982). Facets of constraint focus on the tendency to inhibit the expression of impulse and emotion (control), behavior at odds with social convention (traditionalism), and risk taking (harm avoidance). As with conscientiousness, in research on self-regulation constraint is best considered in terms of its facets.

### *Impulsivity and Related Constructs*

As a trait, impulsivity is the tendency to act without thought or planning. It is evident in early childhood (Clark, 1993) and has a strong neurobiological signature (Spinella, 2004). Impulsive behaviors typically are quick, often inappropriate, and frequently risky. People who are highly impulsive are prone to a host of high-risk behaviors characterized by poor self-control (e.g., Hoyle, Fejfar, & Miller, 2000; Krueger, Caspi, Moffitt, White, & Slouthamer-Loeber, 1996; Wulfert, Block, Ana, Rodriguez, & Colsman, 2002). Although impulsivity can be assessed, and often is studied, as a trait, it also appears as a constituent of broader traits and domains of personality such as extraversion and psychoticism in the P-E-N model (Psychoticism, Extraversion, and Neuroticism; Eysenck, 1990), conscientiousness in the five-factor model (Costa & McCrae, 1992), impulsive sensation seeking in the alternative five-factor model (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993), and the behavioral approach system in Gray's (1994) neurophysiological model. Impulsivity typically is cast as a behavioral liability; however, in conditions that do not allow for forethought or planning, impulsivity can be an asset (Dickman, 1990). In either case, behavior is not consciously regulated by the individual, and therefore the process models described below routinely do not apply.

The idea that self-control is not always adaptive is apparent in the ego control construct (Block & Block, 1980). Ego control is defined as the "expression or containment of impulses and desires" (Letzringa, Block, & Funder, 2004). An important feature of this conceptual model is the notion that individuals can be overcontrolled as well as undercontrolled. Individuals who are undercontrolled do not suppress emotional expression and behavior even when so doing would violate personal or social standards of appropriateness. In terms of self-regulation, they do not exercise self-denial, are emotionally unstable, and are easily distracted. Individuals who are overcontrolled

excessively inhibit emotional expression and behavior. In terms of self-regulation, they are rigidly organized, likely to exercise self-denial when it is not necessary to do so, and persist at tasks when it is no longer productive to do so. According to the model, although the self-regulatory styles of undercontrolled and overcontrolled people ordinarily are maladaptive, under certain conditions they are advantageous. For instance, the self-discipline and persistence characteristic of overcontrolled people would be beneficial when productivity under pressure is required. The spontaneity and emotional expressiveness of undercontrolled people would play well in many social settings. On average, however, a measured degree of ego control results in the most adaptive self-regulation.

Related to impulsivity and ego control is the construct of disinhibition, the inability to control demands on attention, cognition, and behavior that interfere with desired behavior. Specifically, disinhibition involves an inability to prevent interference from competing stimuli, irrelevant thoughts or demands on attention, and reflexive and automatic behaviors. Alternatively, disinhibition can be viewed as a failure of the behavioral inhibition system, which evaluates the relevance of stimuli in terms of what is expected given the situation, responds to inhibitory signals associated with stimuli that are unexpected, and motivates behavior aimed at reducing the influence of those stimuli on cognition, motivation, and behavior (Gray, 1991). In terms of self-regulation, people high in disinhibition are likely to struggle to stay on track in the pursuit of important goals or outcomes.

This selective review of temperament and personality constructs relevant to self-regulation suggests how, and to some extent why, people vary in terms of how they self-regulate, how often they self-regulate, and the degree of success or failure at self-regulation they routinely experience. The personality perspective on self-regulation, exemplified by these constructs, suggests underlying neurophysiological influences and positions self-regulation in the broader context of differences in temperament and personality. With rare exception, however, the personality perspective provides little insight into the cognitive, affective, and behavioral processes that define a specific instance of self-regulation.

## Information-Processing Perspective

An alternative perspective on self-regulation focuses on the specific processes by which information about the self is processed and the implications of that processing for motivation and behavior. The original model of this type, which is prototypic of models that take this perspective, was described within objective self-awareness theory (Duval & Wicklund, 1972). According to the theory, when attention is directed toward the self an evaluation ensues in which current self-representation is compared against internalized standards of correctness as reflected in an ideal self-representation.

This comparison yields affect, typically negative affect stemming from the unfavorable discrepancy between current and ideal self-representations. The negative affect motivates behavior aimed at reducing the discrepancy, either through behavior designed to change current self-representation to more closely approximate ideal self-representation or to direct attention away from the self. Characteristics of this conceptualization that are apparent in other information-processing models of self-regulation include self-awareness, comparison of current self-representation with a behavioral standard, and the management of any unfavorable discrepancy between self-representation and the standard (e.g., Carver & Scheier, 1981; Higgins, 1987; Pyszczynski & Greenberg, 1987). In these models, self-regulation has succeeded when self-representation and the salient behavioral standard are reconciled and attention shifts from the self back to the environment.

Related models offer greater detail in terms of the process and its components. Perhaps the most influential of these models is the control-process model of self-regulation (Carver & Scheier, 1981). This model places less emphasis on self-awareness and negative affect and greater emphasis on sources of behavioral standards and the process by which the discrepancy between those standards and current self-representation are managed. Embellishments to the model focus on the awareness of the rate at which discrepancies are reduced and the implications of this awareness for affect (Carver & Scheier, 1990). Self-discrepancy theory focuses more specifically on sources of behavioral standards, distinguishing between ideal and ought self-representations and detailing the emotions that arise when each is contrasted with current self-representation (Higgins, 1987). As a group, these models offer a rich and detailed account of what people are doing and feeling when they are self-regulating.

Fundamental to these models is the assumption that self-regulation is conscious and effortful. The assumption of consciousness is particularly evident in models that accord self-awareness a central role in the process (e.g., Duval & Wicklund, 1972). The assumption of effort is evident in that all of the models assume an unsatisfactory state that typically is overcome through cognitive or behavioral strategies. This assumption is underscored and, to some extent, validated by accumulating evidence that people are less effective at self-regulation when their ability to expend effort on it has been compromised (Muraven & Baumeister, 2000).

The extent to which these assumptions are, in fact, fundamental has been called into question by a growing body of evidence indicating that some portion of people's goal-oriented behavior is nonconscious and automatic (Bargh & Williams, 2006). Moreover, the influence of goals activated outside of consciousness on behavior may equal the influence of goals activated in a conscious manner (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001). Whether the process initiated by nonconscious activation is similar to the conscious process described earlier is unclear. Furthermore, it is not clear whether activation of all behavioral standards would initiate nonconscious self-regulation, or whether goals are unique in this regard. Nonetheless, it is evident that, at least some of the time, the regulation of behavior requires neither consciousness nor effort.

Models of self-regulation in the information-processing tradition address important concerns regarding what the process of self-regulation entails. They describe stimuli that initiate the process, components of the process, how the process unfolds, and, ultimately, the conditions that cause the process to terminate. Although the information-processing perspective offers a detailed account of the process of self-regulation, it offers little in the way of explaining the developmental origins of this process and variation across people in the characteristic ways the process unfolds.

## Integrating the Perspectives

Although the personality and information-processing perspectives on self-regulation have yielded important empirical and theoretical advances, each offers only a partial explanation of self-regulation. Personality accounts are generally decontextualized, and processing accounts generally ignore fundamental differences between people. A fuller account of self-regulation would be provided by an integration of these complementary perspectives. Elsewhere, I have presented a general framework for integrating trait and process variables in the study of behavior (Hoyle, 2000). In the remainder of this section I draw on that framework to suggest three ways in which the personality and information-processing perspectives on self-regulation could be integrated.

### *Distal–Proximal Approach*

One means of integrating the personality and information-processing approaches focuses on the causal order of their influence on behavior. In this approach the initial focus is a personality–behavior association. Because personality traits are pre-existing characteristics of individuals, the assumption of this approach is that the influence of personality on a specific instance of behavior unfolds in a situated process. In such a model, personality traits are distal influences that operate on behavior through a proximal, online process. Research that exemplifies this approach is rare within the self-regulation literature (for an example, see Tobin, Graziano, Vanman, & Tassinary, 2000). To some extent, this relative lack of distal–proximal research is not surprising because of how studies inspired by the personality and information-processing perspectives typically are done. Research from the trait perspective typically relies on unsituated measurement of traits and summary measures of behavior. Research from the information-processing perspective typically concerns specific instances of a specific behavior in a controlled setting. Investigators working from the information-processing perspective are best situated to integrate perspectives using this approach, needing only to measure relevant traits, preferably before and in a different setting from the controlled setting in which processing and behavior are observed.

### *Conditional Influence Approach*

An alternative means of integrating the two approaches is to examine self-regulatory processing at different levels of temperament or personality traits. For such studies to be successful, neither the self-regulatory process nor the trait on which it is conditioned need to have previously been linked to the behavior. Indeed, it is possible that the consideration of a link between self-regulation and behavior at different levels of a personality trait would reveal an association not evident when the link is evaluated in an unconditional model. In this integrative approach, the effect of the personality trait on the behavior is not of primary interest; thus, traits need not belong to the category of personality traits directly relevant to self-regulation (although frequently they will). An example of such a trait is self-monitoring. Individuals high in self-monitoring are more likely to experience public self-awareness and reference social standards, whereas individuals low in self-monitoring are more likely to experience private self-awareness and reference personal standards (Hoyle & Sowards, 1993). Thus key aspects of the self-regulatory process are conditional on self-monitoring. The implementation of research consistent with this approach would not differ from the implementation of research consistent with the distal–proximal approach. The two approaches differ in terms of the assumed relation between personality and process—causal in the distal–proximal model, no relation assumed in the conditional model—and the assumed relation between personality, process, and the behavior—both personality and process causally related to behavior in the distal–proximal model, no relation between personality and behavior assumed in the conditional model.

### *Conceptually Integrated Approach*

In the distal–proximal and conditional approaches to integrating the personality and information-processing perspectives on self-regulation, the constructs and processes are separately measured or operationally defined, then integrated in the statistical modeling of the data. A more profound integration would be conceptual models that simultaneously implicate personality traits and information processing in such a way that each accounts for the other. At the personality level, such efforts have been attempted for impulsivity (Carver, 2005), narcissism (Morf & Rhodewalt, 2001), and self-monitoring (Hoyle & Sowards, 1993). Dynamic models of personality (e.g., Mischel, 2004), which define personality as invariance in situated emotion, thought, and behavior, hold promise for a broader integration of the personality and information-processing perspectives (see also Cervone, 2004; Morf, 2006). The development of such models for self-regulation requires the thoughtful integration of temperament or personality and information-processing constructs in such a way that personality can be understood in terms of process and processes can be understood as expressions of personality.

## Overview of the Handbook

Chapters in Part I of the handbook explore the emergence and development of the capacity for self-regulation during infancy and early childhood. In Part II, chapters present conceptual models and empirical findings relevant to the integration of basic personality processes and self-regulatory processes in normal adults. The final set of chapters, in Part III, focuses on a range of individual differences that distinguish styles of regulation and their relative effectiveness in the course of everyday life.

### *Temperament and Early Personality*

Eisenberg, Eggum, Vaughan, and Edwards open Part I with a chapter on the temperamental bases of self-regulation. They present key findings from an impressive program of research that spans more than 15 years. They describe a multifaceted model of effortful control—an aspect of temperament—and discuss the association of the facets of effortful control with internalizing and externalizing behavior and with emotionality in toddlers and young children. They compare these relations with those involving reactive control, which differs from effortful control in that it is relatively automatic. This distinction between voluntary and involuntary control processes highlights a useful distinction that has had only a modest influence on models of self-regulation in adulthood (cf. Bargh & Chartrand, 1999). Eisenberg et al. close by pointing out the need for more precise measures of the components of temperament relevant for self-regulation that would facilitate research on causal processes in the relations they have observed as well as studies of the relations between the components as they change with age.

A landmark study in the literature on self-regulation during childhood is Mischel's (1958) experimental study of preference when given a choice between an immediate, but relatively small, reward versus a delayed, but relatively larger, reward. The seminal study showed that young children are increasing able to delay gratification by choosing the larger reward despite the temptation of an immediate reward. Tobin and Graziano review 50 years of research building on this finding. They organize the sprawling literature on delay of gratification using a rubric that both reveals the lack of coherence of this literature and sets the stage for a proposed new model of the processes at play in delay of gratification. Their model is integrative and well-grounded in basic research on perception, valuation, and decision making, setting the stage for a new generation of research on a prototypic instance of self-regulated behavior.

Blair, Calkins, and Kopp examine the relation between self-regulation in young children and their early performance in school. They focus on the role of early biological functioning as it affects executive functioning in the development of effective strategies for managing behavior and emotions. Blair et al. note that, although the components of self-regulation were not routinely assessed in evaluations of preschool programs, it

is likely that the positive effects of those programs on adjustment and well-being can be attributed to their contribution to the development of adequate self-regulatory skills and strategies. They highlight findings from recent evaluations of a new preschool program that indicate clear effects on executive functioning and self-control. Their analysis provides strong support for early interventions that attend to biological functions that serve as a foundation for effective self-regulation in the academic context.

The final chapter in Part I, contributed by McDermott and Fox, concerns the role of response monitoring in self-regulation. Consistent with the analysis by Blair et al., these authors draw attention to the underlying neurobiology as it develops during early childhood. Building on findings from imaging, physiological, and behavioral studies of response monitoring and related constructs, the authors make a strong case for focusing on response monitoring in evaluations of effectiveness at self-regulation and attempts to improve self-regulation. Their analysis concludes by relating response monitoring to aspects of temperament and showing that whether response monitoring is adaptive depends on where young children stand on temperamental traits such as fearfulness.

### *Personality Processes*

Morf and Horvath fittingly open Part II, which focuses on personality processes, by discussing a model that integrates the trait and information-processing perspectives on self-regulation within a general, dynamic personality framework. They define personality as the individual's unique approach to constructing and maintaining self-representations through intrapsychic and, mostly, interpersonal self-regulatory processes. A core component of their model is the regularity in contingencies between situations and individuals' responses to them, which give rise to "signatures of the self." They illustrate the dynamic components of their model by selectively applying it to personality traits such as rejection sensitivity and narcissism. Morf and Horvath's chapter sets the stage for the remainder of Part II by demonstrating the conceptual integration of trait and information processing perspectives on self-regulation in a coherent, dynamic model of personality.

Whereas Morf and Horvath describe a model in which personality emerges from patterns of situated self-regulation, McCrae and Löckenhoff begin with the dominant model of personality, the five-factor model, and locate characteristic patterns of self-regulation within it. Specifically, the authors draw on five-factor theory to provide an account of how individual differences in self-regulation emerge from basic aspects of personality. By influencing the behavioral standards that guide self-regulation, affective reactions during self-regulation, and mechanisms by which experience is reconciled with standards, a person's standing on the five principal personality factors and their constituents define the psychological context within which self-regulation takes place. Like Morf and Horvath, McCrae and Löckenhoff persuasively argue that personality and self-regulation are entwined. A fundamental difference between the two accounts is the question of which gives rise to the other. Longitudinal research

that begins with young children, such as that featured in Part I of the handbook, will be required to determine whether, or perhaps when, one takes precedence over the other.

Niemiec, Ryan, and Deci discuss the concept of autonomy in self-regulation terms. Their analysis touches on a core assumption of many models of self-regulation—that individuals exercise will in choosing among behaviors and outcomes. In their view, true self-regulation implies autonomy, which varies from one action to the next. Furthermore, people vary in their tendency to function autonomously; that is, they vary in the extent to which they regulate their own behavior. The authors offer a critique of theoretical perspectives that question the possibility of autonomy and, therefore, self-regulation. By disentangling independence and autonomy, they show how behavior contingent on the environment can, nonetheless, be autonomous if the individual exercises choice in allowing for the environmental influence. Similarly, automatized behaviors can be autonomous if, upon reflection, they would be chosen by the individual and, if desired, could be overridden. Defined in this way, autonomy is essential for self-regulation and, more broadly, for healthy psychological functioning.

Sansone, Thoman, and Smith describe their work on the self-regulation of motivation. In their model, while individuals are engaged in goal-directed behavior motivated by personal and/or situational characteristics, their motivation might increase or decrease as a function of their experience of engaging in the behavior. Of particular import is the degree to which the behavior is experienced as interesting. They specifically consider occasions when motivation provided by personal or situational characteristics is high, but interest is low. It is under these conditions that individuals might sustain the behavior by increasing interest through self-regulation. They review a host of studies that illustrate the role of personality in when and how interest is self-regulated. They illustrate the role of interest regulation in two important contexts—career choice and relationship maintenance. Sansone et al.'s work exemplifies the integration of the personality and information-processing perspectives on self-regulation through the conditional influence approach described earlier.

Karoly describes his conceptual model of self-regulation and reviews research inspired by the model. As in the previous chapters in Part II, the author argues that, to be fully understood, models of self-regulation must account for characteristics of the individual as they are manifest and operate in situational context. A strength of Karoly's model is its specificity, both in terms of what self-regulation is and what it is not. The goal construct is central in his model and is specified and assessed at a level of detail unmatched by other accounts of goal pursuit. Karoly illustrates the usefulness of this model for understanding specific and consequential goal-guided activities such as pain management, physical exercise, and academic performance. Theory-driven measurement is a centerpiece of Karoly's work, and he presents compelling results of work that makes use of measurement tools design to capture the richness of goals and goal-related thoughts and behaviors. These measures exemplify the author's assertion that self-regulation is complex and multilayered, and that empirical efforts to understand self-regulation ought to be designed in such a way that they capture this complexity and richness.

In the final chapter in Part II, DeWall, Baumeister, Schurtz, and Gailliot discuss the implications of variability in the capacity for self-regulation for the expression and influence of personality traits. They liken the capacity for self-regulation to strength or energy such as that generated by a muscle. They review evidence indicating that, as with muscular strength, this capacity is limited; thus it can be exhausted, leading to ego depletion and consequent failures of self-regulation. They reason that when the capacity for self-regulation is compromised, the influence of personality on behavior may be strengthened or weakened. For instance, when social convention runs contrary to what personality might dictate, ego depletion, by undermining the capacity to follow social convention, should result in pronounced effects of personality on behavior (cf. Caspi & Moffitt, 1993). Conversely, when the expression of a personality trait involves self-regulation, ego depletion should thwart that expression, resulting in a reduction in the influence of personality on behavior. DeWall et al. present data from a large number of studies to illustrate these and other conditions under which ego depletion strengthens or weakens the expression and influence of personality. Their work is prototypic of the conditional influence approach to integrating personality and self-regulation described earlier in this chapter.

### *Individual Differences*

Ilkowska and Engle begin Part III, which concentrates on individual differences relevant to self-regulation, by drawing our attention to variability in a fundamental aspect of information processing: working memory. After defining the working memory system and its functions, the authors describe research showing that, as children's working memory develops, their effectiveness at self-regulation improves. They also show that variability in working memory capacity in adulthood is associated with various aspects of the information processing involved in self-regulation. Personality and social psychologists who study self-regulation will find particularly useful a section of the chapter on measuring working memory capacity. In the latter half of the chapter, the authors draw on a number of literatures to show the link between working memory and a host of problem behaviors and behavioral deficits typically viewed as resulting from poor self-regulation.

Scholer and Higgins provide an overview of regulatory focus theory, highlighting two fundamentally different forms of self-regulation. Self-regulation from a promotion orientation involves striving for ideals through accomplishment and growth, whereas self-regulation from a prevention orientation involves fulfilling duties and obligations through safe and responsible behavior. Importantly, although individuals vary across situations in their characteristic orientation, situational pressures can cause them to self-regulate in ways that are not characteristic of them. Because individuals can be shifted from one orientation to the other, the literature inspired by regulatory focus theory includes, in addition to studies in which regulatory focus is measured, experiments in which individuals are randomly assigned to a promotion or prevention

orientation. Scholer and Higgins draw on both types of studies to provide a detailed account of how promotion- and prevention-focused self-regulation operate in circumstances that require self-regulation (e.g., failure, temptation, group dynamics). A key feature of their model, upheld by a growing empirical literature on regulatory focus, is that, generally speaking, neither orientation is superior to the other. In the best case, individuals self-regulate from the orientation that best matches current situational pressures.

The chapter by Maddux and Volkmann focuses on self-efficacy, a highly influential construct that captures variation in beliefs about what one can and cannot do in certain conditions. Self-efficacy differs from other individual differences covered in Part III of the handbook in its specificity. Self-efficacy beliefs refer to specific behaviors and arise from direct and indirect experience with the behavior. Although self-efficacy beliefs are behavior specific, the likelihood of developing strong self-efficacy beliefs can be attributed, in part, to stable traits. The authors review research that points to a number of basic personality dimensions associated with the development of self-efficacy beliefs. A key contribution of the chapter is their discussion of self-efficacy beliefs as they influence the process of self-regulation at different stages. They conclude the chapter with a section on collective efficacy, a group's shared beliefs about its competencies, introducing the term "collective regulation" to refer to the members of a group working together to pursue shared goals.

Jostmann and Koole discuss self-regulation as action control, presenting a continuum that, at its extremes, defines two orientations to self-regulation in demanding situations. Individuals with an action orientation readily develop intentions to act so as to manage situational demands, whereas individuals with a state orientation are indecisive and hesitant in demanding situations. Like the promotion and prevention orientations outlined in regulatory focus theory, individuals differ reliably in their tendency to adopt one or the other orientation but could, in specific situations, adopt either orientation. According to the authors, high demands challenge working memory and related processes necessary for effective self-regulation. Individuals with an action orientation are able to shield against these challenges—using cognitive, affective, and behavioral strategies—and therefore manage high demands in ways that individuals with a state orientation cannot. The authors close with a discussion of practical strategies available to action- and state-oriented individuals for managing demanding situations.

Magen and Gross offer a systematic analysis of self-control in the face of temptation. Drawing on extant models of self-regulation and emotion regulation, they propose a process model of self-control. They use relatively common temptation situations to highlight components of the process prescribed by their model. They propose an interplay between personality and the process of self-control. Personality influences both the types of objects and activities that are tempting to the individual and the self-control strategies they invoke. At the same time (and consistent with Morf and Horvath's analysis in Part II), characteristic strategies for exercising self-control in the face of temptation influence personality. The authors draw on a variety of

literatures in personality and self-regulation in support of each step of the proposed process.

Kruglanski, Orehek, Higgins, Pierro, and Shalev define self-regulation in goal-pursuit terms, highlighting two fundamental aspects of self-regulation: assessment and locomotion. Assessment concerns processes associated with comparison in self-regulation; specifically, comparisons between alternative goals or means to achieving goals. Locomotion refers to processes in self-regulation that involve moving from the current state toward another state. In regulatory mode theory, these modes are orthogonal; that is, concern for one has no implications for concern for the other. Temperament and experience govern the degree to which individuals differ in their concern for each in the process of self-regulation. In terms of goal pursuit, high levels of locomotion are associated with preferences for activity, and high levels of assessment are associated with preferences for evaluation of alternatives. Although some goal pursuits emphasize one over the other, in general, goal pursuit is most effective when the two modes are effectively implemented. The authors illustrate these modes and the relative effectiveness of the various combinations of preferences for them by reviewing their accumulated work on individual and interpersonal goal pursuits. They also discuss research demonstrating the value of a regulatory mode analysis for performance and change in organizations and cultural differences.

Crocker, Moeller, and Burson draw attention to the incompatibility of self-regulation devoted to managing self-esteem and self-regulation focused on achieving important long-term goals. They refer to a focus on self-esteem maintenance as egosystem motivation and argue that, because of the emotions it entails, it occupies attention, motivation, and cognitive resources that might otherwise be used in the pursuit of goals that focus away from the self and toward others. They present findings from their research program on contingencies of self-esteem that illustrate the deleterious effects of the chronic and situational pursuit of self-esteem—low intrinsic motivation, high stress, and premature abandonment of relevant activities. Ecosystem motivation, in contrast, encompasses a concern for others and self in relation to others. It involves less emotion than egosystem motivation (though it is not free of emotion), and is characterized by self-regulation that is more effective and not an impediment to supportive relationships with others. They present findings from new research on the degree to which the tendency to pursue compassionate goals—those that emphasize constructiveness and support of others—is associated with improved self-regulation in the pursuit of personal goals.

VanDellen, Bradfield, and Hoyle continue the focus on self-esteem and self-regulation by examining the self-regulation of state self-esteem as a function of trait levels of self-esteem. They argue that, unlike trait self-esteem, which is quite stable across the lifespan, state self-esteem varies from moment to moment. Because self-regulation is prompted by discrepancies between expectations and reality, the strongly positive view of self characteristic of individuals high in trait self-esteem and the likelihood of social feedback that does not support this view ensures that they must routinely manage their state self-esteem through self-regulation. VanDellen et al.

present findings showing that state self-esteem is particularly likely to fluctuate in social situations that are unpredictable and uncontrollable. They then review findings from two lines of research showing that high self-esteem people engage in cognitive and affective strategies aimed at maintaining a positive view of themselves in the moment.

Strauman and Wilson draw on findings from a wide range of traditions, including animal models and human brain imaging, to explore similarities and differences between models of approach and avoidance in goal pursuit. They begin by outlining two levels of analysis at which approach and avoidance tendencies might be described. Description at the biobehavioral level, as exemplified in models of behavioral activation and inhibition, focuses on early appearing individual differences that are, at least in part, heritable and that focus on the brain. Description at the social-cognitive level, as exemplified in regulatory focus theory, focuses on individual differences in information processing as they play out in social environments. The authors conclude that these levels represent two sets of processes that are activated by different stimuli but often function simultaneously, though not necessarily with the same orientation. In their brain imaging research, they indeed find that different neural substrates underlie the two levels of approach and avoidance. The chapter concludes with a discussion of the value of exploring self-regulation processes as they manifest at multiple levels of analysis.

Leary, Adams, and Tate fittingly conclude the handbook by proposing a strategy for managing situations in which attempts at self-regulation produce undesired outcomes. Examples include increased frequency of thoughts one is trying to suppress, overeating by individuals on a diet, and poorer sleep by individuals who try to control their sleep. To combat these ironic effects, Leary et al. propose a novel strategy—hypoegoic self-regulation. Sometimes hypoegoic states, characterized by low self-awareness and/or heightened focus on concrete behaviors in the present moment, occur spontaneously, as in the case of the performance of a well-learned behavior and the state of flow. Hypoegoic self-regulation is the intentional effort to produce or prolong hypoegoic states. This regulation can involve taking steps to reduce self-awareness or taking steps to focus on concrete behaviors in the present. Leary et al. describe strategies for pursuing either route to a hypoegoic state. For instance, self-awareness can be reduced through extensive practice or meditation. A focus on concrete behavior can be promoted by stimulating a focus on how, rather than why, a behavior is enacted or by training focus narrowly on behavior in the present moment (e.g., mindfulness). Leary et al. conclude by reviewing a series of individual differences likely to be associated with the ability to experience hypoegoic states. This novel conceptualization suggests that, under certain conditions, the most successful self-regulation strategy is not to self-regulate.

This handbook comprises a strong set of contributions from scholars at the forefront of the current wave of interest in self-regulation. They present findings from productive research programs that focus on self-regulatory processes while attending to individual variation in how those processes unfold. I hope this volume inspires deeper

consideration of self-regulatory processes by temperament and personality researchers, and a better accounting for personality by social-cognitive researchers, as they develop new models and approaches to the study of self-regulation.

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# Part I

*Temperament and Early Personality*

# 2

# *Relations of Self-Regulatory/Control Capacities to Maladjustment, Social Competence, and Emotionality*

**Nancy Eisenberg, Natalie D. Eggum, Julie Sallquist, and Alison Edwards***

Although the topic of self-regulation frequently has not been embedded in theory and research on temperament or personality, recent findings in psychology as well as neuroscience and genetics indicate that individual differences in self-regulatory capabilities have a strong temperamental basis. In this chapter, we define temperament as "constitutionally based individual differences in reactivity and self-regulation, in the domains of affect, activity, and attention" (Rothbart & Bates, 2006, p. 100). Thus, temperament has a biological (including genetic) basis, although it is viewed as influenced by maturation and experience. Rothbart and Bates (2006) argued that temperament is the "affective, activational and attentional core of personality, whereas personality includes much more than temperament, particularly the content of thoughts, skills, habits, values, defenses, morals, beliefs, and social cognition" (p. 100).

Rothbart and Bates (2006) proposed that much of temperament is subsumed by the constructs of self-regulation and reactivity. Self-regulation refers to "processes such as effortful control and orienting that function to modulate reactivity," whereas reactivity refers to "responsiveness to change in the external and internal environment" (p. 100), including emotional responses and physiological reactivity.

Central to the temperamental bases of self-regulation is the construct of *effortful control*, defined as "the efficiency of executive attention—including the ability to inhibit

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a dominant response and/or to activate a subdominant response, to plan, and to detect errors" (Rothbart & Bates, 2006, p. 129). Effortful control includes the abilities to shift and focus attention as needed, to activate and inhibit behavior as needed, especially when one does not feel like doing so, and other executive functioning skills involved in integrating information, planning, and modulating emotion and behavior. Effortful control is believed to be centered in the anterior cingulate gyrus but also involves regions of the prefrontal cortex (e.g., Goldsmith, Pollak, & Davidson, 2008; Rueda, Rothbart, McCandliss, Saccomanno, & Posner, 2005). It appears to be grounded in components of executive functioning, especially executive attention. Effortful control and executive functioning have been linked to variation in specific candidate genes (see Posner, Rothbart, & Sheese, 2007), providing evidence of effortful control's heredity bases.

Eisenberg and colleagues (e.g., Eisenberg & Morris, 2002; see also Carver, 2005; Derryberry & Rothbart, 1997; Nigg, 2000) have sought to differentiate the truly regulatory processes involved in effortful control from other aspects of control (or the lack thereof) that seem to be involuntary or so automatic that they often are not under voluntary control. Such *reactive control* processes pertain to relatively involuntary motivational approach and avoidance systems of response reactivity that, at extreme levels, result in impulsive undercontrol and rigid overcontrol. Measures typically tap (but are not confined to): (a) impulsivity (speed of response initiation, including surgent approach behaviors) and (b) overcontrol (rigid, constrained behavior) or behavioral inhibition (slow or inhibited approach, distress, or subdued affect involving in situations involving novelty or uncertainty; Derryberry & Rothbart, 1997; Kagan & Fox, 2006). Pickering and Gray (1999) and others have argued that approach and avoidance motivational systems related to impulsive and overly inhibited behaviors, respectively, are associated with subcortical systems such as Gray's Behavioral Activation System (which involves sensitivity to cues of reward or cessation of punishment) and Behavioral Inhibition System (activated in situations involving novelty and stimuli signaling punishment or frustrative nonreward). Cacioppo, Gardner, and Berntson (1999) noted that although approach and avoidance systems have different biological substrates, they have reciprocally activated behavioral manifestations.

Reactive overcontrol and undercontrol appear to load on a different factor in confirmatory factor analyses than does either effortful control or negative emotionality. Rothbart, Ahadi, Hershey, and Fisher (2001) generally have found three factors of childhood temperament: (a) negative affectivity, including negative emotions such as anger, fear, sadness, and discomfort, as well as low soothability; (b) extraversion/surgency, including high intensity pleasure, positive anticipation, impulsivity (reactive undercontrol), activity level, low shyness (likely reflecting reactive overcontrol to some degree), and less consistently, high levels of smiling/laughter; and (c) effortful control, including attention focusing, inhibitory control, low intensity pleasure, perceptual sensitivity, and often smiling/laughter. The loading of low intensity pleasure and perceptual sensitivity on effortful control perhaps occurred because well-regulated children are more likely to notice subtle stimulation and to enjoy low level positive stimuli. Moreover,

high intensity positive emotion is probably relatively unregulated and involves an approach motivation and extraversion/surgency, as does impulsivity (Gray & McNaughton, 2000).

Children's self-regulation and reactive control often are assessed with adults' reports of effortful control, self-reports for older children, and/or behavioral measures. It is likely that some of those measures such as delay tasks tap both constructs as they can involve modulation of attention, inhibition of approach, and impulsive approach to rewards.

In this chapter, we review research on the relation of individual differences in children's self-regulation, reactive control, and emotionality to children's externalizing and internalizing problem behaviors, as well as relations of regulation/effortful control to their positive and negative emotionality. Because one goal in our work has been to differentiate effortful control and reactive control when predicting (mal)adjustment, we discuss findings relevant to both constructs. We focus foremost on research from our laboratory, but frequently mention patterns in others' findings.

## Relations of Self-Regulation/Reactive Control to Maladjustment and Social Competence

Based on a heuristic model in which Eisenberg and colleagues discussed different styles of control/regulation (i.e., inhibited, undercontrolled, and optimally controlled; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg & Morris, 2002), we hypothesized that children prone to externalizing problems are low in all types of effortful control, high in reactive undercontrol (impulsivity), and low in reactive overcontrol, as well as prone to emotions such as anger/frustration. In contrast, children with internalizing problems (a broad grouping of problems such as anxiety, depression, social withdrawal, and somatic complaints) were predicted to be low in the components of effortful control that most directly and strongly contribute to emotion regulation (e.g., attentional control) and in activational control (the ability to activate behavior when one is motivated not to do so), low to average in inhibitory control (the ability to inhibit behavior when one is motivated to act), low in reactive undercontrol, and high in reactive overcontrol. They also are expected to be prone to negative emotions, especially fear, sadness, and worry, and low in positive emotionality. Children high in social competence were hypothesized to be high in all types of effortful control, moderate in reactive control (not overly impulsive or overcontrolled), low to moderate in negative emotionality, and high in positive emotionality. We summarize some relevant studies below.

### *Externalizing Problems and Social Competence*

Externalizing problems in children generally include aggression, defiance of authority, delinquency, and related acts such as destruction of property. Such problems in children

have frequently been related to low self-regulation (e.g., Kochanska & Knaack, 2003; Lengua, West, & Sandler, 1998; Martel et al., 2007; Oldehinkel, Hartman, Ferdinand, Verhulst, & Ormel, 2007; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Rydell, Berlin, & Bohlin, 2003). However, in many of the existing studies, different aspects of effortful control/self-regulation were not examined or the data were only cross-sectional. With longitudinal data, one can better examine (but not prove) issues related to direction of causality, especially if one can control for initial levels of variables.

*Relations of effortful control to externalizing problems and social competence.* In a series of studies we have examined relations of effortful control to externalizing problems. In one set of studies, we obtained parents' (usually mothers') and teachers' reports of effortful control and mothers', fathers', and teachers' reports of maladjustment; in addition, some behavioral measures of regulation were administered. Children were classified into groups as having relatively high levels of externalizing problems, internalizing problems, both types of problems, or neither type. Consistent with expectations, in a sample of US children aged 4.5 to about 7 years, those high on externalizing (or comorbid), in comparison to nondisordered children, were low in adult-reported effortful control—attention shifting, focusing, *and* inhibitory control—often even when using across-reporter data, and low on some behavioral measures of effortful control (Eisenberg, Cumberland, et al., 2001). Two years later, similar relations were obtained (Eisenberg et al., 2005; also see Eisenberg et al., 2009, for the 4-year follow-up). Change in status over the two years was not predicted by effortful control, however, perhaps because of its stability across time. Similarly, in a sample of young Chinese school children, those rated by peers and teachers as high in externalizing problems were lower on attention focusing and inhibitory control than nondisordered children (Eisenberg et al., 2007).

In other studies we examined the relations of an aggregate measure of effortful control (usually containing adults' reports of attention focusing, attention shifting, inhibitory control, and often a behavioral measures of effortful control) to externalizing problems and social competence, within and across time. In an early longitudinal study, we found evidence that individual differences in preschoolers' attentional control were related to low levels of nonconstructive responses when dealing with real-life anger (Eisenberg, Fabes, Murphy, et al., 1994), as well as with adults' reports of good social skills and peers' reports of popularity (primarily for boys, Eisenberg et al., 1993). In follow-ups every two years (until age 11–12), we continued to find evidence that effortful control (often combined with low impulsivity) was related, within and often across time, with socially appropriate behavior, as well as low levels of parent-reported externalizing problems (Eisenberg, Fabes, Murphy, et al., 1995; Eisenberg, Fabes, Shepard, et al., 1997; Murphy, Shepard, Eisenberg, & Fabes, 2004). In a different study of preschool children, adult-reported effortful control was related to teachers' reports of children's rejection by peers (Spinrad et al., 2004) and with aggression (Hanish et al., 2004). In research in China involving young elementary

school children (Zhou, Eisenberg, Wang, & Reiser, 2004; a different sample than Eisenberg et al., 2007), effortful control was related to children's peer-reported leadership/sociability and low aggression, as well as adults' reports of socially appropriate behavior and low aggression (combined). Effortful control was also associated with low levels of externalizing and internalizing problems and high levels of social skills in France (Hofer, Eisenberg, & Reiser, in press). Moreover, in Indonesia, adult-reported effortful control tended to be positively related to school children's adult-reported social skills/low levels of externalizing problems (a composite), as well as peers' reports of liking and socially competent or incompetent behavior (Eisenberg, Pidada, & Liew, 2001). Similar relations generally held two years later, but primarily for boys (Eisenberg, Liew, & Pidada, 2004).

In two longitudinal studies starting with children in early elementary school who were assessed every two years (one is the Eisenberg, Cumberland, et al., 2001, sample discussed already), we found effortful control predicted externalizing problems across two or four years, even when accounting for earlier levels of externalizing problems in structural equation models and when examining prediction by effortful control that was unique from the variance accounted for by impulsivity (Eisenberg, Spinrad, et al., 2004) or an index of ego overcontrol versus undercontrol (Valiente et al., 2003; see also Eisenberg, Guthrie, et al., 2000). In one of the samples (Eisenberg, Spinrad, et al., 2004), we found evidence that externalizing problems in early elementary school also predicted effortful control two years later (as well as vice versa). Thus relations between effortful control and externalizing problems may be reciprocal.

In the same two samples (again using structural equation models controlling for initial levels of variables when predicting over time), attentional effortful control predicted popularity and/or socially appropriate behavior, within and across time, through its relation to resiliency (Eisenberg, Fabes, Guthrie, et al., 2000; Eisenberg, Guthrie, et al., 1997; Spinrad et al., 2007). Children high in attentional effortful control tended to be more resilient, and resiliency in turn predicted popularity and socially appropriate behavior (also see Eisenberg, Guthrie, et al., 1997; Eisenberg, Valiente, Fabes, et al., 2003). Similarly, resiliency mediated the relation between effortful control and preschoolers' agreeableness (Cumberland-Li, Eisenberg, & Reiser, 2004) and adolescents' social skills (Hofer et al., in press).

In a paper involving a different sample, Spinrad et al. (2007) examined the relations of effortful control to externalizing problems and social competence at 18 and 30 months of age—much younger than examined in most studies. In structural equation models, effortful control predicted low externalizing problems and high social competence at both ages. However, across one year, when controlling for the stability of constructs, these relations dropped out. It is possible that one year was too short a period to demonstrate relations above and beyond the stability of effortful control and externalizing problems or social competence across time. Alternatively, perhaps effortful control is too immature at 18 months to have a causal effect on quality of social functioning in the second year of life.

*Relations of reactive control with externalizing and social competence.* In general, reactive undercontrol tends to relate positively to externalizing problems (e.g., Krueger, Caspi, Moffitt, White, & Stouthamer-Loeber, 1996; Lemery, Essex, & Smider, 2002; Martel et al., 2007). In our early studies, we often combined measures of impulsivity and effortful control because they are negatively related. More recently, we have differentiated the two constructs because they often provide unique prediction of outcomes or relate differently to outcomes.

In our study in which we compared children with externalizing problems with those with neither internalizing nor externalizing problems, we found that children with externalizing problems tended to be relatively impulsive (as rated by adults; Eisenberg, Cumberland, et al., 2001; Eisenberg et al., 2005). In addition, impulsivity or an index of reactive undercontrol versus overcontrol (using items selected from Block & Block's, 1980, ego control measure) predicts high levels of externalizing problems (using a continuous rather than categorical index), both when the measure is pure (Eisenberg, Spinrad, et al., 2004; Valiente et al., 2003) and when it is combined with low inhibitory control (behavioral effortful control; Eisenberg, Guthrie, et al., 2000; see also Eisenberg, Guthrie, et al., 1997). We also have found that impulsivity is associated with low popularity (Spinrad et al., 2006) and agreeableness (Cumberland-Li et al., 2004).

In younger children, moderate to relatively high levels of impulsivity or reactive undercontrol seem to be related to *greater* personality resiliency because reactive overcontrol is related to low resiliency (Eisenberg, Fabes, et al., 2000; Eisenberg, Spinrad, et al., 2004). By early adolescence, the correlation between resiliency and reactive undercontrol versus overcontrol was somewhat negative, but became positive when the low levels of effortful control associated with impulsivity were controlled (Eisenberg, Valiente, Fabes, et al., 2003). It is likely that some spontaneity associated with impulsivity contributes to resiliency; as Block and Kreman (1996), argued, "the human goal is to be as undercontrolled as possible and as overcontrolled as necessary. When one is more undercontrolled than is adaptively effective or more overcontrolled than is adaptively required, one is not resilient" (p. 351).

*Relations of emotionality to externalizing problems and social competence.* Negative emotionality is a defining feature of some types of psychopathology (American Psychiatric Association, 2000). However, it has been argued that there is some specificity in the nature of the relation between emotionality and maladjustment, such that externalizing problems typically are associated with anger/irritability and internalizing problems are associated with sadness and fear (Eisenberg, Cumberland, et al., 2001; Rothbart & Bates, 2006).

Consistent with expectations, negative emotionality has been associated with high levels of externalizing problems in diverse labs (Colder & Stice, 1998; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Lemery et al., 2002; Oldehinkel et al., 2007; Rothbart, Ahadi, & Hershey, 1994; Zeman, Shipman, & Suveg, 2002). Negative emotions may motivate emotionally driven externalizing behavior; moreover, externalizing children, especially if aggressive, may become more angry and hostile over time because they are rejected and victimized by peers (Rubin, Bukowski, & Parker, 2006).

Like others, we have found that children with externalizing problems are relatively likely to experience and/or express anger (e.g., Eisenberg, Cumberland, et al., 2001; Eisenberg et al., 1999, 2005, 2009; Hanish et al., 2004; Murphy & Eisenberg, 1997) or negative emotionality more generally (e.g., Eisenberg, Fabes, Shepard, et al., 1997). Similar relations between anger or relatively intense negative emotionality and externalizing problems and/or low social competence also have been found in China (Eisenberg et al., 2007; Zhou et al., 2004) and Indonesia (Eisenberg, Liew, et al., 2004; Eisenberg, Pidada, et al., 2001). For example, preschoolers high in dispositional negative emotionality or negative emotional intensity are viewed by adults as high in nonconstructive coping and tend to cope in nonconstructive rather than constructive ways (e.g., using nonabusive verbalizations) with real-life negative emotion (e.g., by taking positive action or seeking support), which likely undermines the quality of their peer relationships (Eisenberg et al., 1993, Eisenberg, Fabes, Murphy, et al., 1994; Maszk, Eisenberg, & Guthrie, 1999). Moreover, venting negative emotion in these real-life encounters predicted lower social competence (especially for girls) and more externalizing problems two and/or four years later (Eisenberg et al., 1999).

The relation between negative emotionality and quality of social functioning is not independent, of course, of the relation between effortful control and social functioning. As is discussed below, negative emotionality and effortful control tend to be negatively related (Hanish et al., 2004; Zhou et al., 2004). Moreover, we have found that young children who are high in effortful control exhibit less negative emotionality in intense real-life encounters with peers, which in turn predicts higher social competence (Fabes et al., 1999). For preschool girls, anger tends to result in poorer regulation, which in turn is associated with peer victimization (Hanish et al., 2004; see also Eisenberg et al., 1999).

Children's externalizing problems also have been related to emotions such as sadness (Eisenberg, Cumberland, et al., 2001; Eisenberg et al., 2005, 2009; contrast with Hanish et al., 2004), whereas anxiety/distress has been related to relatively low social competence (e.g., Hanish et al., 2004; Spinrad et al., 2004). It is likely that dispositional differences in anxiety, sadness, and related emotions contribute to low social competence, and that negative social experiences also increase children's tendencies to experience distress, sadness, and anxiety.

Negative emotionality, especially anger/frustration, also is a moderator of the relation between effortful control (and sometimes reactive control) and children's social competence and low levels of externalizing problems. In general, the relation between effortful control (or a combination of effortful control and low impulsivity) and social competence (Eisenberg, Fabes, Shepard, et al., 1997; Eisenberg, Fabes, et al., 2000), externalizing problems (Eisenberg, Guthrie, et al., 2000; Eisenberg, Spinrad, et al., 2004; Valiente et al., 2003), and/or resiliency (Eisenberg, Fabes, et al., 2000; Eisenberg, Guthrie, et al., 1997) has been stronger for children prone to negative emotionality/anger than for less emotionally negative children (although relations for less negative children are sometimes significant). It is likely that being regulated is more important for modulating social behavior for children who are prone to negative

emotion. Similarly, there is evidence that emotional intensity moderates the relation of effortful control to sympathetic concern. Children who are high in the tendency to generally experience intense emotions—positive and negative—may be especially likely to be sympathetic if they are well regulated (Eisenberg, Fabes, Murphy, et al., 1996; Eisenberg, Fabes, Shepard, et al., 1998).

## Relations of Effortful Control, Reactive Control, and Emotionality to Internalizing Problems and Shyness

Effortful control and reactive control have been theoretically and empirically linked to internalizing and to shyness, an aspect of temperament related to internalizing. In childhood, *temperamental shyness* is defined as inhibited approach in a novel social context (Rothbart et al., 2001). Shyness has been related to later internalizing problems (e.g., Caspi, Henry, McGee, Moffitt, & Silva, 1995; Schmitz et al., 1999) and, when more severe and associated with social withdrawal, is seen as an internalizing problem. Internalizing is often contrasted with externalizing, but the constructs are often positively related or comorbid (Achenbach & Edelbrock, 1983).

### *Effortful Control and Internalizing Problems*

Some researchers have suggested that effortful control capabilities buffer people from internalizing problems. Attentional control has been associated with low levels of internalizing problems such as anxiety and depression (e.g., Derryberry & Reed, 2002; Silk, Steinberg, & Morris, 2003). Attentional control may facilitate moving attention from negative to neutral or positive thoughts, which is believed to reduce negative emotion. Similarly, attentional control enables attention to be directed away from threatening stimuli (Derryberry & Rothbart, 1997), which should reduce negative arousal, assist in regulating behaviors associated with shyness or social withdrawal, and contribute to quality of social interactions (e.g., Eisenberg, Shepard, et al., 1998).

Inhibitory control is conceptually unrelated to internalizing and shyness and would not be expected to be associated with internalizing or shyness. Shy individuals may demonstrate high inhibition of approach behaviors, but the inhibition may be involuntary. Due to this involuntary behavioral inhibition, shy children may *appear* high in inhibitory control to adults who report on their functioning. Nonetheless, if attentional control is involved in effortful inhibiting behavior, there could be a modest relation of inhibitory control with internalizing problems due to inhibitory control reflecting attentional control. Shy individuals are probably less adept at effortfully inhibiting avoidance tendencies when approach is adaptive, an ability reflected in activational control (i.e., capacity to perform an action when there is strong tendency to avoid it).

*Relations between general effortful control and internalizing problems (and shyness).* Support for a negative relation between internalizing and general effortful control is somewhat mixed. Whereas some researchers have found that effortful control is negatively related to internalizing problems (Eisenberg, Cumberland, et al., 2001; Muris, de Jong, & Engelen, 2004), others have not (Eisenberg et al., 2005; see Rydell et al., 2003) or have found a positive relation (Murray & Kochanska, 2002). Persistent/severe internalizing problems are likely associated with more serious deficits in effortful control than nonpersistent/less severe internalizing problems.

In our own laboratory, we have examined the relations of internalizing problems or shyness to both composite indices of effortful control and specific modes of effortful control. Eisenberg and colleagues (e.g., Eisenberg, Spinrad, et al., 2004) explored relations of temperament and maladjustment in a sample in which children with adjustment problems were oversampled in order to obtain internalizing, externalizing, comorbid, and control groups. At Time 1 (T1), children were between 55 and 97 months old. Follow-up data were collected two years later (T2). In a structural equation model in which impulsivity also was a predictor, Eisenberg, Spinrad, et al. (2004) found that resiliency mediated the negative relations between effortful control and internalizing at two points in time, two years apart, in childhood (effortful control $\rightarrow$ resiliency $\rightarrow$ low internalizing problems). In a model in which T1 and T2 constructs were represented, T2 resiliency significantly mediated the relation between T2 effortful control and T2 low internalizing when controlling for T1 levels of the constructs. Furthermore, in a model in which T1 predictors were all correlated at T1 (and at T2 as needed), T1 effortful control positively predicted T2 resiliency, which was correlated with T2 internalizing, providing stronger support for mediation (Cole & Maxwell, 2003). Moreover, in a study of toddlers, we found that high effortful control related to lower separation distress (albeit not inhibition to novelty; Spinrad et al., 2007). In one of the few studies relating shyness with effortful control, Eisenberg, Pidada, et al. (2001) found that Indonesian third graders' shyness was negatively related to effortful control within adult reporters (i.e., parent reports and teacher reports). Three years later (T2), Eisenberg, Liew, et al. (2004) found that teacher-rated shyness was negatively associated with teacher-rated effortful control within T2. T1 teacher-rated regulation was marginally negatively related to girls' T2 teacher-rated shyness.

Findings regarding effortful control and shyness-related behaviors have not always been consistent. Spinrad et al. (2004) hypothesized that preschoolers who were high in emotions such as anxiety and who were low in effortful control would display reticent behaviors (onlooking and unoccupied behavior thought to be a behavioral reflection of shyness) with peers. Contrary to hypothesis, effortful control assessed during the first semester was positively related to reticence displayed during the second semester. They suggested that children experiencing slight anxiety might employ regulatory skills, which allow them to remain on the perimeter of play with minimal anxious arousal. Spinrad et al. noted that the method of observation used in this study might not fully account for social play entrance and exit. Children classified as reticent in this study

may have eventually entered the group. In fact, Asendorpf (1990) contended that the majority of children engage in onlooking from a distance and parallel play before interacting with groups of peers.

*Relations between attentional control and internalizing problems (and shyness).* Aspects of effortful control may relate differently to internalizing problems. Eisenberg, Cumberland, et al. (2001) found that internalizing children's (55 to 97 months) attentional control was lower than control children's but higher than externalizing children's. Two years later, internalizing children did not differ from control children (but were somewhat higher than externalizing children) on attentional control (also see Eisenberg et al., 2009, for similar studies four years later). Thus children classified as internalizing at T2 were more similar to control children with respect to attentional control than were the children classified as internalizing at T1 (Eisenberg et al., 2005). In the same sample, symptoms of social withdrawal were also associated with low attentional effortful control (Eggum, Eisenberg, Spinrad, Valiente, et al., 2009). Similar to findings in the US, in China, internalizing first and second graders were higher than externalizing children in teacher-rated attention, but were lower than control children in teacher- and parent-rated attention focusing (Eisenberg et al., 2007).

In terms of shyness, Eisenberg, Shepard, et al. (1998) studied 4- to 6-year-olds and collected data two, four, and six years later. During elementary school, teachers, but not parents, rated shy children as low in attentional control. Occasionally, parent-rated shyness was positively related to parent-rated attention focusing. Differences in the relation between teacher- and parent-rated attentional control and shyness were likely due to the context in which shyness and attention were observed and may reflect shyness subtypes. Eisenberg, Fabes, and Murphy (1995) found college students' self-reported shyness was negatively related to attention shifting.

*Relations between inhibitory control and internalizing problems.* Findings on the relations of inhibitory control to internalizing problems have varied somewhat across studies, but generally indicate that there is at least a weak negative relation. For example, Riggs, Blair, and Greenberg (2003) found that high observed inhibitory control predicted a decrease in first and second graders' parent-rated, but not teacher-rated, internalizing from T1 to T2 (two years later). Lengua (2003) found third through fifth graders' inhibitory control (a composite of mother and child reports) negatively related to internalizing (a composite of mother-reported internalizing and child-reported depression) concurrently and one year later. At T1, but not T2, observed inhibitory control during a Simon Says task related negatively to internalizing. Martel et al. (2007) found that adolescents' poor observed response inhibition only weakly predicted adult-reported (composite of mother, father, and teacher reports) internalizing problems. Eisenberg, Cumberland, et al. (2001) found that internalizing children were similar to control children (but higher than externalizing children) in adult-reported inhibitory control and found similar relations two and four years later (Eisenberg et al., 2005, 2009). In contrast, first and second graders in China with

internalizing problems were higher than externalizing children in teacher-rated inhibitory control and were lower than control children in parent-rated inhibitory control (Eisenberg et al., 2007). In regard to shyness, inhibitory control has been inconsistently related (e.g., Aksan & Kochanska, 2004; Eisenberg, Fabes, & Murphy, 1995; Pfeifer, Goldsmith, Davidson, & Rickman, 2002). There appears to be a weak but inconsistent positive relation of inhibitory control with internalizing problems, but it is unclear how much is due to a lack of differentiation between effortful and less effortful forms of inhibition.

### *Relations between Reactive Control and Internalizing Problems*

People with internalizing problems are generally overcontrolled or behaviorally constrained and commonly experience rumination (Garnefski, Kraaij, & van Etten, 2005). Thus these individuals appear to be prone to high reactive overcontrol (e.g., behavioral inhibition; note that effortful inhibitory control differs from reactive behavioral inhibition) and low in reactive undercontrol (impulsivity). Some researchers have classified inhibition to novelty in early childhood as an internalizing problem (Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006). However, the tendency to display behavioral inhibition is seen early in childhood and has been linked to underlying physiology (see Kagan & Snidman, 2004); thus we consider it an aspect of temperament. Temperamental shyness is thought to relate to reactive overcontrol, in that it involves social behavior inhibited through nonvolitional processes.

There is evidence that overcontrolled people are prone to internalizing problems (Biederman et al., 1990; Juffer, Stams, & van IJzendoorn, 2004; Kagan & Snidman, 1999), and perhaps especially social anxiety (Hirshfeld-Becker et al., 2003; Schwartz, Snidman, & Kagan, 1999). In contrast, impulsivity has been negatively related to internalizing or shyness (e.g., Huey & Weisz, 1997), although impulsivity occasionally has been unrelated or positively related to internalizing problems (e.g., O'Brien & Frick, 1996; Lengua et al., 1998, respectively). Eisenberg, Cumberland, et al. (2001) found that internalizing children were lower than nondisordered and externalizing children in impulsivity. Two and four years later, they were still less impulsive than nondisordered children and consistently less impulsive than externalizing children (Eisenberg et al., 2005, 2009). Similarly, Eisenberg et al. (2007) found internalizing children were lower than control children in parent-rated, but not teacher-rated, impulsivity in a sample of Chinese children. Adult-rated impulsivity was lower for internalizing than externalizing children.

### *Relations of Emotion to Internalizing Problems*

People with internalizing problems, by definition, are high in negative emotions such as anxiety, depression, and fear. Furthermore, experiences associated with internalizing problems (e.g., peer rejection) may exacerbate children's negative emotionality and

maintain internalizing problems. Researchers have struggled with how to assess relations of internalizing problems with emotionality because temperamentally based emotions, such as sadness and fear, and internalizing symptoms overlap. One approach to the problem has been to remove items judged to be problematic (in terms of overlap) from the temperament and/or internalizing problem measures in an attempt to assess "pure" internalizing and temperamental emotion (Eisenberg et al., 2005; Lemery et al., 2002; Lengua et al., 1998). Moreover, because some types of internalizing problems such as social withdrawal do not inherently involve negative emotion, some investigators have focused on relations of negative emotionality to that subset of internalizing problems (e.g., Eisenberg, Cumberland, et al., 2001).

Researchers have argued that sadness and fear are especially likely to be associated with internalizing problems (Eisenberg, Cumberland, et al., 2001; see Rothbart & Bates, 2006). Although anger is sometimes thought to be more closely associated with externalizing, it may be associated with internalizing problems as children experience peer difficulties or increased social demands (e.g., Eisenberg et al., 2005).

Lemery et al. (2002) examined the prediction of adjustment at 5.5 years from temperament at 3.5 and 4.5 years and found that anger, fear, and sadness were positively related to internalizing problems (see also Blumberg & Izard, 1985). Similarly, Eisenberg, Shepard, et al. (1998) found that shy children generally were relatively high on adult-rated negative emotionality (i.e., autonomic reactivity, sadness, and fear); the relation between shyness and fearfulness may be strongest at a young age (Eggum, Eisenberg, Spinrad, Reiser, et al., 2009). In a study of more specific emotions, Eisenberg, Cumberland, et al. (2001) found children high in internalizing and social withdrawal alone were generally lower than externalizing children and slightly higher than control children in adult-reported anger. In addition, internalizing children were generally higher than control and externalizing children in sadness. Socially withdrawn children were higher than control children in sadness. Two years later, Eisenberg et al. (2005) found internalizing children were higher than controls and marginally lower than externalizing children in anger (although they were fairly equivalent four years later; Eisenberg et al., 2009). In addition, internalizing children were higher than controls but not higher than externalizing children in fear, and were higher than controls and sometimes externalizing children in sadness (see Eisenberg et al., 2009, for similar findings four years later). Furthermore, high anger and, to a lesser degree, sadness at the follow-up, rather than effortful control, predicted whether or not internalizing developed or continued across 2 years (initial levels of the emotion and effortful control were controlled). Similarly, young Chinese school children with internalizing problems were higher than nondisordered children in parent- and teacher-reported anger and were lower in teacher-rated anger than externalizing children (Eisenberg et al., 2007). Indonesian third graders' parent-reported shyness was negatively related to peer-reported anger (Eisenberg, Pidada, et al., 2001). Three years later, teacher-reported shyness was concurrently positively related to teacher-reported negative emotional intensity but negatively related to girls' peer-reported anger (shy children may have inhibited angry behavior with peers; Eisenberg, Liew, et al., 2004).

The expected positive relation between negative emotionality and internalizing-like behavior has not always been found. For example, Spinrad et al. (2004) found that preschoolers' reticence during play related to low levels of anger, within and across time. In contrast, teachers' or parents' reports of preschoolers' anxious-fearful behavior tended to be positively related to solitary play (and occasionally reticent behavior), which could be more closely related to sustained social withdrawal than is reticent behavior. In the same sample, Hanish et al. (2004) found a positive relation between teacher-reported social withdrawal and adult-reported anxiety, but not observed sadness/anxiety.

In Eisenberg's (Eisenberg & Fabes, 1992; Eisenberg, Fabes, et al., 2000; Eisenberg & Morris, 2002) model, people high in negative emotion intensity who also are not well regulated (e.g., attentionally) are especially likely to withdraw in social situations. They may desire to interact, but behavior is inhibited in order to cope with aversive negative emotion. This model is related to Asendorpf's model (1990) of shyness, in which the combination of high approach and high avoidance elicits feelings of both anxiety and interest. In support of Eisenberg and Fabes idea, negative emotionality has been positively related to shyness for children low in attention shifting (Eisenberg, Shepard, et al., 1998). In contrast, Eisenberg et al. (2007) found that high anger positively and low effortful control (attentional focusing and inhibitory control) negatively predicted internalizing versus nondisordered group membership in China. Inhibitory control more strongly differentiated nondisordered and internalizing children for those low in anger.

## Relations of Self-Regulation to Emotionality and Its Expression

In Rothbart's theory of temperament (Rothbart & Bates, 2006), effortful control modulates emotional reactivity. However, this modulation may differ for negative and positive emotionality.

### *Effortful Control and Positive Emotion*

As children develop, they begin to experience and form the association that positive emotions occur when goals are reached or accomplished (see Dix, 1992; Gianino & Tronick, 1988); this, in turn, may promote exploration within an environment (Klinnert, 1984). Children's exploration affords them the opportunity to increase their thought and action repertoires because it results in learning about new situations and objects (Fredrickson, 1998).

Developmental scientists have not frequently theorized about the role of positive emotion in self-regulation. However, Fredrickson (1998, 2001) proposed a broaden-and-build theory of positive emotions in which she hypothesized that positive

emotions broaden people's thought processes and build people's action tendencies. Broadening thought processes have an impact on cognitive problem solving as well as social interactions. For example, people's cognitive flexibility helps them solve difficult cognitive problems (see Isen, 2002). In addition to cognitive flexibility, broadening thought processes by having the ability to take multiple perspectives (allocating attention—related to aspects of effortful control) about a situation should result in better processing, which in turn is expected to lead to the best outcome or solution in a situation. Over time, positive emotions can build resources and skills for a person to use when faced with a challenging situation (Fredrickson, 1998).

We predict that more modulated types of positive emotionality tend to be positively associated, whereas unmodulated, exuberant positive emotion is negatively related with effortful control. Consistent with this view, Rothbart et al. (2001) found that mothers' reports of young children's smiling/laughter generally loaded in confirmatory factor analyses as strongly or more strongly on the effortful control construct than on extraversion/surgency (which contained the impulsivity subscale). In contrast, high intensity pleasure and positive anticipation tended to load more strongly on extraversion/surgency than on effortful control (although loadings of positive anticipation on effortful control were often .30 or higher). Kochanska, Aksan, Penney, and Doobay (2007) found that children's positive expressivity during scripted observational measures (e.g., peek-a-boo) was negatively related to effortful control whereas their positive expressivity during parent–child naturalistic observations was positively related to effortful control. More research needs to be conducted to examine discrepancies in relations involving types of positive emotion using behavioral measures of the various constructs.

Based on this reasoning, it is likely that certain types of children's positive emotionality are associated with (and perhaps even predict) their effortful control. However, when attentional control and inhibitory control have been examined, we and other researchers have not always found significant, positive relations between positive emotions and effortful control (parents' reports on multiple types of positive emotions—Lengua, 2002, 2003; positive expressivity in a social context, Liew, Eisenberg, & Reiser, 2004). This lack of significance should be interpreted with caution because positive emotionality typically was measured with only one indicator of positive emotion in each study. Moreover, the type of positive emotion or its intensity may be critical (see below).

As an example, in a study conducted in our laboratory with young children, positive emotions were observed in emotion-eliciting situations (e.g., experimenter blowing bubbles; children freely exploring toys) and reported by mothers and nonparental caregivers. Vaughan (2006) found that positive emotionality and children's effortful control were significantly positively related only within reporters, whereas observed positive emotions (i.e., behavioral measures) were unrelated to reports of effortful control. This pattern of findings could be attributed to reporter biases such that reporters who viewed a child as regulated also may have viewed him or her as emotionally positive (or vice versa). Moreover, the observed assessments measured only

one aspect (i.e., expressivity) of children's positive emotionality and in very specific contexts.

In contrast to Vaughan's data, Kochanska, Murray, and Harlan (2000) found a negative relation between children who scored relatively high on a battery of attentional and inhibitory control tasks and children's expression of intense joy (the task involved the experimenter tickling the child; see also Kochanska & Knaack, 2003). This relation likely reflects the fact that intense joy or exuberance is negatively related to regulation or effortful control.

In summary, findings on the relations of positive emotionality to effortful control are not consistent. Research is needed in which different types of positive emotion are measured (e.g., intense joy, interest, social positive emotion, asocial positive emotion).

### *Reactive Control and Positive Emotion*

It is likely that the association between reactive control and positive emotion is different than the association between effortful control and positive emotion. One can imagine a situation where a child impulsively grabs a desired object. After obtaining the object, the child is likely to react with positive emotion. Theorists have argued that individual differences in tendencies to approach rewarding stimuli (e.g., Gray's Behavioral Activation System) are linked to impulsivity and often positive emotion (see Rothbart et al., 2001; Rothbart & Bates, 2006), and impulsivity and high intensity positive emotion both tend to load positively on the surgency temperament factor in early and middle childhood (Rothbart et al., 2001). Moreover, asymmetrical activation of the left prefrontal cortex has been linked with both positive emotion and approach behavior (see Davidson, Pizzagalli, Nitschke, & Kalin, 2003; Harmon-Jones, 2003; Harmon-Jones, Lueck, Fearn, & Harmon-Jones, 2006; Rothbart & Bates, 2006). Thus, although impulsive approach behavior is likely associated with frustration and anger (and aggression; see Eisenberg, Fabes, et al., 2000; Hirshfeld-Becker et al., 2003), it also is likely to be associated with positive emotionality.

In an ongoing longitudinal study, we examined children's positive emotion in various situations (e.g., experimenters blowing bubbles to the children; mothers playing with toys with their children) when children were approximately 18 months old and again when they were 30 and 42 months old. Intensity of children's positive emotion was coded while the experimenter blew bubbles (from Laboratory Temperament Assessment Battery; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1999) and children's positive expressivity (e.g., smiling and/or positive tone of voice, laughter) was coded during free play. Children's observed positive emotion during both tasks at 18 and 30 months was uncorrelated with their mothers' reports of reactive undercontrol (impulsivity/activity) at those ages. Children's positive emotion at 42 months during the bubbles task was positively related to their mothers' reports of reactive undercontrol at 18 and 30 months (but not 42 months). Even though these analyses are initial and simplistic, they suggest that early reactive control may predict children's later exuberant

positive expressivity. Additionally, the relations for bubbles and lack of relations for free play provide initial support for the differentiation of types of positive emotions and their relations to regulation.

### *Effortful Control and Negative Emotion*

Overall, researchers have found a negative relation between effortful control and negative emotionality, especially assertive, aversive negative expressivity. Such a relation would be expected because children who are optimally regulated should be relatively able to modulate their emotional impulses as needed.

Rothbart and her colleagues found that attentional control, an aspect of effortful control, was related to lower levels of negative emotion in adults (Derryberry & Rothbart, 1988) and infants (Rothbart, Ziaie, & O'Boyle, 1992) and this finding has been replicated in studies in other laboratories using a variety of methods with children. For example, Eisenberg, Fabes, Nyman, Bernzweig, and Pinuelas (1994) examined the relation between preschoolers' observed real-life anger reactions and teachers' ratings of attentional control. Boys' attentional control was positively related to their use of verbal objections when angered (the child verbally defends himself or demands action on another's part; e.g., "Hey, that's mine!"). For girls, there were no significant relations between attentional control and anger reactions (relations were found between other indices of coping). However, in a longitudinal follow-up of the same sample, Eisenberg, Fabes, Shepard, et al. (1998) generally found negative relations between parents' and teachers' reports of children's regulation and negative emotionality. Hanish et al. (2004) found that teacher-reported effortful control was inversely related to parents' and another teacher's reports of children's anger and observed anger at preschool (similar relations with anxiety were not significant). In a different sample, Fabes et al. (1999) found that preschoolers who were high in effortful control were relatively unlikely to experience strong negative emotional arousal in response to peer interactions, but this relation held only for moderate to high intensity interactions.

Similar patterns of relations between effortful control and negative emotionality have been obtained in non-Western samples. Zhou et al. (2004) and Eisenberg et al. (2007) found that parents' and teachers' reports of Chinese children's effortful control and anger/frustration were negatively related, sometimes across reporters. In a study of Indonesian children, Eisenberg, Pidada, et al. (2001) obtained similar relations between parents' and teachers' reports of young school children's effortful control and negative emotionality; however, relations generally were not found for peer-reported anger or self-reported regulation. Nonetheless, in a 3-year follow-up, teacher-reported effortful control was negatively related to peer-reported anger (Eisenberg, Liew, et al., 2004).

In addition to findings for directly experienced emotions, one might expect effortful control to be negatively related to intense, overly arousing levels of vicariously induced

negative emotion (sometimes labeled personal distress). However, effortful control would be expected to be positively related to high levels of sympathetic concern (i.e., feelings of concern for another based on the apprehension of their emotional state or condition). Eisenberg and colleagues (e.g., Eisenberg, Fabes, Murphy, et al., 1996) reasoned that if children are able to regulate their negative emotion, they are better able to focus their attention on another person's need or distress instead of on their own empathic overarousal. Consistent with this argument, children who are higher in effortful control have been reported to have fewer feelings of self-focused personal distress and higher levels of sympathy when confronted with others in need or distress (Valiente et al., 2004). Eisenberg and colleagues (e.g., Eisenberg, Fabes, Murphy, et al., 1996; Eisenberg, Fabes, Shepard, et al., 1998; Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999) generally found positive relations of children's effortful control (sometimes combined with low impulsivity) and sympathy, within and sometimes across time. They also found that children who were low in effortful control were low in sympathy regardless of their emotional intensity, whereas for children who were moderate or high in effortful control, their level of sympathy increased with their level of emotional intensity. This relation was partially replicated two years later for boys (Eisenberg, Fabes, Shepard, et al., 1998).

The findings with children are consistent with work linking adults' effortful control (often attentional control) with dispositional sympathy and low personal distress (Eisenberg & Okun, 1996), although sometimes this relation was not found unless individual differences in emotionality were controlled (Eisenberg, Fabes, Murphy, et al., 1994; Okun, Shepard, & Eisenberg, 2000). In the Eisenberg, Fabes, Murphy, et al. (1994) study, friends' reports of students' regulation also were associated with self-reported sympathy. In contrast, self-reported emotion regulation was negatively related to self-reported sympathy with children in need in a videotape, perhaps because sympathetic people view themselves as not regulating their vicarious emotions.

### *Reactive Control and Negative Emotion*

Children who are highly impulsive are driven by an approach and rewards system and are therefore expected to display positive emotion when they obtain rewards, but negative emotion (such as anger or frustration) when the rewards are unattainable. Behavioral inhibition (reactive overcontrol) would be expected to be positively related to negative emotions because of its links with anxiety and depression (Hirshfeld-Becker et al., 2003). Moreover, children who are highly overcontrolled may exhibit shy and withdrawn behaviors and are therefore likely to be rejected by their peers, creating higher levels of negative emotions, especially fear and anxiety.

In general, reactive overcontrol and undercontrol do seem to be related to children's negative emotionality. Because children with internalizing problems often have problems with overcontrol, relevant studies pertaining to overcontrol were reviewed in the previous section on internalizing problems. In regard to impulsivity (undercontrol),

Aksan and Kochanska (2004) found that impulsivity in 14- to 45-month-olds generally was negatively related to fearfulness. Similarly, Eisenberg, Guthrie, et al. (1997) found that parent-reported overcontrol versus undercontrol (i.e., ego control) was negatively related to parents' and/or teachers' reports of negative emotional intensity; this relation was likely due to the association of reactive undercontrol with intense negative emotions. These findings were replicated at the 4-year follow-up (Eisenberg, Valiente, Fabes, et al., 2003). Moreover, the relation between impulsivity and negative emotion (anger) has been found in a non-Western culture such as China (Eisenberg et al., 2007).

### *General Expressivity*

Overall, based on the findings that effortful control is related to low levels of negative emotionality (e.g., Eisenberg et al., 1993) and modulated levels of joy (e.g., Kochanska et al., 2000), it seems that effortful control is related to low levels of expressivity (either negative or positive). However, as discussed by Eisenberg and Morris (2002), optimal regulation is expected to be associated with moderate levels of emotion and its expression. Thus the relation between effortful control (thought of as optimal regulation) and expressivity could be quadratic (i.e., effortful control positively related to moderate levels of expressivity and negatively related to low and high levels of expressivity).

Eisenberg, Zhou, et al. (2003) examined the relations between elementary school-aged children's adult-reported (parent and teacher) effortful control and general emotional expressivity at two assessments, 2 years apart. High scores on the general emotional expressivity scale are indicative of unregulated emotion and have been related to negative outcomes (e.g., externalizing problems; see Eisenberg, Losoya, et al., 2001). Relations between expressivity and effortful control were more quadratic than linear: in general, moderate expressivity was associated with the highest levels of effortful control and high expressivity was associated with low levels of effortful control (findings for low expressivity were varied). In contrast to the quadratic relations for effortful control, reactive overcontrol was fairly consistently related to low expressivity.

## Future Directions

It is clear that temperamentally based self-regulation and reactive control are related to adjustment, maladjustment, and negative emotionality. Effortful control generally is associated with positive developmental outcomes and low or moderate levels of expressivity and negative emotionality, whereas reactive overcontrol and undercontrol are often associated with negative outcomes. However, questions regarding causality and the mechanisms or processes that account for relations of effortful control (or other measures of self-regulation) to maladjustment, social competence, and emotionality remain. Genetic factors may partly account for the associations; for example, Lemery-Chalfant,

Doelger, and Goldsmith (in press) found that heredity partly accounted for the correlation between difficult temperament and internalizing and externalizing problems. However, this genetic overlap could include evocative effects of the child—e.g., parents' reactions to children's unregulated behavior; thus environmental factors, even if evoked by genetics, can have an effect on children's adjustment. In addition, unshared environmental factors such as differential parenting or peer experience may, in interaction with individual differences in self-regulation, account for relations of children's effortful control with adjustment, maladjustment, and emotionality. For example, some researchers have proposed that effortful control may be viewed as a protective factor that contributes to the discontinuity of internalizing or externalizing problems. There is a need for research that more precisely delineates why self-regulation is associated with a range of important socioemotional outcomes.

Gunnar and colleagues argued that measures of effortful control rely heavily on the ability to inhibit approach response rather than the ability to inhibit avoidance response (Gunnar, Sebanc, Tout, Donzella, & van Dulmen, 2003). Relatively little is known about the development of activational control—the ability to make oneself approach rather than avoid stimuli or activities—and its relation to (mal)adjustment and emotionality. Moreover, it may be difficult to accurately assess pure effortful control (effortful control that does not reflect reactive control as well), particularly in people whose dominant response is avoidance or withdrawal. The development of measures that more accurately differentiate effortful control from reactive overcontrol (or low impulsivity) may lead to clearer findings with respect to the unique contributions of effortful control and reactive control to psychological symptoms.

There is reason to believe that the unique relations of effortful control and reactive control change with age. For example, it appears that the unique relation of reactive control or impulsivity to externalizing problems (i.e., this relation when controlling for the relation of effortful control to externalizing problems) diminishes with age (e.g., Eisenberg, Spinrad, et al., 2004; Valiente et al., 2003). As effortful control becomes stronger, it may increasingly control overt manifestations of reactive tendencies. However, this pattern of relations may not hold for social competence (see Eisenberg, Valiente, Fabes, et al., 2003). In future work, it would be useful to examine the joint and unique relations of effortful control and reactive control to a range of developmental outcomes and how this relation changes with age.

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# 3

# *Delay of Gratification*

## A Review of Fifty Years of Regulation Research

**Renée M. Tobin and William G. Graziano**

In 1958, the *Journal of Abnormal and Social Psychology* published a report of experimental research by Walter Mischel. Several aspects of this paper provide clues about what was to come in the next 50 years. It reported focused empirical work using an experimental method to probe seemingly intractable theoretical questions. The research was published in a journal dedicated to abnormal psychology, but the clear message was that delay processes underlying abnormal behavior were on a continuum with typical behavior. The research looked toward cognitive and social psychology for explanation, rather than stimulus–response learning or psychodynamic theory. Major graduate-level textbooks covering social psychology theory quickly recognized the research as important for understanding human socialization (e.g., Jones & Gerard, 1967, pp. 95–99). In the next 50 years Mischel, his students, and his collaborators would contribute more than 200 papers, many of which addressed issues in delay of gratification and resistance to temptation.

Within this time frame, researchers examined delay of gratification across the lifespan, yielding some important longitudinal results. For example, Funder, Block, and Block (1983) found significant positive relations between delay of gratification at age 4 and measurements of both ego control and ego resiliency at ages 3, 4, 7, and 11 years. Examining even more distal behaviors, Mischel and colleagues found that delay of gratification measured early in childhood was linked to long-term achievement, better coping abilities and stress management, and greater social competency in adolescence (Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990). Consistent with these findings, Rodriguez, Mischel, and Shoda (1989) found that low ability to delay gratification was related to poor regulatory capacities and increased risk for disruptive behavior disorders.

This chapter reviews the empirical literature and theoretical underpinnings of delay of gratification research. Definitions used in the literature are diverse, often

imprecise, and occasionally tautological. Frequently, operational definitions and procedures are equated with the latent hypothetical construct. We define delay of gratification as a set of motivational and cognitive processes related to choice of a later or more distant goal at the expense of an immediate goal. The traditional definition in the literature replaces the word goal with "reward" or "gratification." The goal-based definition recognizes that goals and rewards are conceptually separate. Our definition acknowledges that goals can remain constant despite changes in rewards, and rewards can remain constant despite goal changes (cf. Mischel, 1984, p. 353). Delay of gratification is a subordinate construct within the larger, superordinate construct of resistance to temptation. There are processes other than delay of gratification that could produce resistance to temptation. In turn, resistance to temptation is part of the larger construct of regulation or self-regulation (Jensen-Campbell & Graziano, 2005; Tobin & Graziano, 2006).

The potential number of studies is large. As shown in Table 3.1, we identified a minimum of 618 articles through a PsycINFO search from 1896 to December 2007 with a keyword of "delay of gratification." To organize these studies, we set exclusionary criteria. We excluded research papers not written in English; not published in a peer-reviewed journal; not using humans; and focused primarily on disordered populations involving mental retardation, ADHD, and obesity. Also excluded were studies focused on gambling, drugs, alcohol, and cigarettes, or addictions. We did not include studies primarily addressing economic theories. A full list of references identified through this review is available from the authors. Priority for discussion in this chapter was given to research using experimental methods, sound methodologies, children and adolescents, and to research testing explicit hypotheses. Despite being removed from the review and tally, several excluded studies are discussed, primarily because they addressed conceptual or methodological issues. The remaining 225 studies were categorized by age group. Tallies are only approximate because some studies involve multiple age groups. A total of 21 papers, one of which reported a meta-analysis, were dedicated to theory alone. The largest number of studies were dedicated to preschoolers ($n = 65$) and college students ($n = 63$), followed by school-age children ($n = 55$), and adults ($n = 22$). Fewer studies used adolescents ($n = 10$), toddlers ($n = 8$), and infants ($n = 2$). For purposes of exposition here, we report outcomes without reference to sex unless a difference was reported. This is justified by the outcome of a meta-analysis of the delay of gratification literature (Silverman, 2003). The 33 published studies examining sex differences in delay of gratification yielded a significant but small difference ($r = .06$) favoring girls and women. There was no evidence that sex interacted with age of participants in influencing delay of gratification.

We sorted each included study into one and only one cell within a $5 \times 5$ matrix, displayed in Table 3.2. The first dimension involved five theoretical perspectives or approaches: (a) psychoanalytic and psychodynamic, (b) behavioral: S–R version, (c) achievement motivation, (d) behavioral: social-cognitive version, and (e) hot–cool system. Crossed with the first dimension was a second, involving five key delay of gratification

**Table 3.1** Delay of Gratification Articles Published Between 1896 and December 2007

| | *# of articles remaining* |
|---|---|
| Total | 618 |
| Exclusions by PsycINFO limit settings | |
| Nonhuman participants | 566 |
| Non-English | 540 |
| Nonpeer-reviewed journals | 365 |
| Disordered population | 285 |
| Exclusions by authors | |
| Additional articles with nonhuman participants | 281 |
| Additional articles with disordered populations | 277 |
| Theory only (inc. 1 meta-analysis) | 256 |
| Non-US participants | 239 |
| Native American comparisons | 230 |
| Addiction research | 225 |

variables: (a) attention, (b) affect, (c) interpersonal demands and others, (d) cognition, and (e) developmental processes and age as a proxy for developmental level. Classification is only approximate because theoretical positions have evolved in the last 50 years, and some studies involve multiple approaches and variables. Furthermore, some studies were published before the cognitive revolution, at a time when the variable of attention was more sharply differentiated from cognition than it was after the revolution (Baars, 1986). Wherever possible, classification is based on the primary focus of the research, as reported by the authors. We discuss the matrix in terms of the most representative studies, within priorities noted previously. The 17 studies published in the last seven years (between 2000 and 2007) received special consideration. Some studies clearly defy classification. For example, Bjorklund and Kipp (1996) note that evolutionary mechanisms may have prepared humans with special capacities for delaying gratification.

## Foundation of Delay of Gratification Research in Theory

### *Psychodynamic Accounts*

Discussions of processes related to self-regulation, resistance to temptation, and delay of gratification appear in writing from ancient times (e.g., Aristotle's *akrasia*), through Puritan training guides (e.g., Locke), to modern philosophy (e.g., Sartre). The progenitor for much of the modern scientific research on delay of gratification appears to be Freud's psychodynamic theory (Freud, 1922; Metzner, 1963; Sears, 1975; Singer, 1955).

**Table 3.2** Selected Delay of Gratification Articles Categorized by Theory and Focus

| | *Attention* | *Affect* | *Interpersonal demands/others* | *Cognition* | *Developmental level/age* |
|---|---|---|---|---|---|
| Psychoanalytic | Singer (1955); Miller & Karniol (1976) | | | | |
| Behavioral | | | | | |
| Stimulus–Response | Sears, Maccoby, & Levin (1957); Amsel (1992) | | Houck & LeCuyer-Maus (2004); LeCuyer & Houck (2006) | Nisan & Koriat (1984) | Garon & Moore (2007) |
| Stimulus–Stimulus | | Mischel et al. (1972) | Putnam et al. (2002) | Mischel & Moore (1973); Mischel & Baker (1975) | Nisan (1974); Yates et al. (1981); Mischel & Mischel (1983) |
| Achievement Motivation | | Mischel (1961); Mischel & Gilligan (1964) | | | |
| Cognitive–Behavioral | Mischel & Ebbesen (1970) | Moore et al. (1976); Schwartz & Pollack (1977); Thompson et al. (1997) | Mauro & Harris (2000); Sethi et al. (2000) | Moore et al. (1976); Saltz et al. (1977); Toner & Smith (1977) | Yates & Mischel (1979) |
| Hot–Cool System | | | | Metcalfe & Mischel (1999); Mischel & Ayduk (2002) Peake et al. (2002) | Hongwanishkul et al. (2005) |

In this theory, delay of gratification is part of an ego-centered process linking primary and secondary process thought. Unconscious primary process impulses seeking immediate gratification are held in check by the ego's secondary processes. A fantasy image of the desired object is generated, onto which a cathexis is attached to provide immediate gratification. From a modern social-cognitive perspective, this might be described as self-distraction in the service of adaptation to the reality of the immediate situation.

### *Behaviorist Accounts (S–R Version)*

The stimulus–response (S–R) behaviorists were skeptical of the proposed psychodynamic process, but they did not question the delay of gratification phenomenon itself. Instead they proposed alternative processes based on stimulus–responses relations (Amsel, 1992; Mowrer & Ullman, 1945; Sears, Maccoby, & Levin, 1957). S–R behaviorists had a strong aversion for cognitive variables. In keeping with this aversion, they commonly used nonhuman animals (e.g., rats) for research so that the clutter of the "mental mirage" (Skinner, 1967) did not obscure close observation of S–R processes. Mowrer and Ullman recast the problem of impulse control by adding a quasi-cognitive mediator to their S–R analysis. The mediator was symbolic representation, a process pervasive in humans, and perhaps in nonhuman mammals but to a lesser extent. Symbolic representation allowed the (human?) organism to weigh the merits of the immediate and delayed reward on a common scale. The cognitive camel was now in the S–R behaviorist tent. A different recasting came from the S–R behaviorist Amsel (1992) in his research on frustration. In this theory, temporary frustration builds up when a previously reinforced response is no longer reinforced. The frustration can be classically conditioned to the situation, producing "dispositional learning." This form of learning is implicit and without awareness, a result of repeated exposure to an event. For Amsel, most forms of invigoration, suppression, persistence, and regression are endpoints of dispositional learning. Amsel's theory was cited repeatedly by delay of gratification researchers (e.g., Mischel, Ebbessen, & Zeiss, 1972). It is curious that Amsel made almost no reference to humans, even when he discusses implications and future directions in his 1992 summary book. He makes no discernable effort to integrate his work with theory or research on human learning or frustration, much less delay of gratification. Whatever researchers thought of this theory, however, many recognized that delay of gratification could be frustrating, that frustration could motivate behavior, and that frustration could accumulate over time.

### *Achievement Motivation and Delay*

Researchers came to recognize that explanations for delay of gratification (and most other forms of social behavior) were unlikely to come from psychodynamic

approaches or S–R versions of behaviorism (Bandura & Mischel, 1965; Mischel, 1973; Sears, 1975), but perhaps explanations could be found in other theories specifically devoted to human behavior. One prospect was the need-centered theories of achievement motivation (McClelland, Atkinson, Clark, & Lowell, 1953). In particular, need for achievement (nAch) includes testing the self against standards of excellence, and exhibiting behaviors that allow such testing (e.g., taking moderate risk, but avoiding both high and low risk activities that give no diagnostic information about skills). Mischel (1961) explored the links among nAch, preference for delayed-larger reinforcements, occupational aspirations, and acquiescence in 112 Trinidadian children. The behavioral measure of delayed–immediate preference involved a small candy bar or a much larger one (later). In addition, two verbal questions asked delay-related preferences involving money and a gift. The delay measures summed to give each participant a score ranging from 0 to 3. This is a severely restricted range, biasing toward the null hypothesis. Despite this, the correlation between nAch (as measured by TAT) and the composite delay preference was statistically significant. The correlation was $r = .27$.

Mischel and Gilligan (1964) examined the links among delay preferences, nAch, and willingness to cheat to earn an achievement award. The participants were 6th-grade boys ($N = 49$) attending two public schools in Boston. In this study, delay was measured as a single dimension using a 17-item delay–immediate choice battery. Excluding three children who never cheated, total number of immediate choices correlated with cheating ($r = .31$), and total delayed choices correlated inversely with time before cheating ($r = .38$). There was no evidence, however, that achievement motivation was related to delay choices. Failure to replicate the association found in Trinidad between nAch and delay preferences was attributed to sex of examiner interactions, but may have been due to low statistical power or to differences in procedures for measuring delay preferences. The Boston measure of delay had more items and was probably more reliable than the one from Trinidad. As reasonable and theoretically justifiable as it seems, the association between nAch and delay–immediate preferences appears weak, if they systematically covary at all.

Taken together, these results suggested that the motivation underlying achievement strivings offer little toward the understanding of delay of gratification (and vice versa). What was needed was a new theoretical approach that addressed a set of core questions. What are the processes that link affect to cognition? All of the previous theories observed that for delay of gratification to occur, basic early-appearing affective reactions come under the control of later developing cognitive processes (including attention). Perhaps another version of behaviorism would offer the answers.

### *Behaviorist Accounts (Social-Cognitive Branch) of Delay of Gratification*

Not all behaviorists avoided cognitive explanations, nor did all behaviorists insist that reinforcement was necessary for learning. Within the Tolman-based S–S contiguity version of behaviorism, Bandura (1977) proposed a cognitive social learning theory.

In it complex social behavior could be learned and regulated through observational learning, without direct reinforcement. Cognitive processes like memory and attention were key mediators. Social learning theory provided a secure base for the largest number of delay of gratification studies from 1960 to 2007.

With the wisdom of hindsight, it seems almost intuitively obvious that children could acquire delay of gratification preferences from observing others, and not just their parents. At issue among the various theories were the processes that undergirded observational learning, not that it occurred at all. The key variables were attention, cognitive processes including memory and mental images, affect including frustration, developmental processes related to cognition and memory, and the role of other people in the interpersonal environment.

Within the social learning theory framework outlined previously, the variables of attention and cognition (including memory) attracted the most empirical research. At least in logic, gaining and holding the attention of the observer was foundational for later processes of memory (retention and reproduction; see Musser, Graziano, & Moore, 1987). In the case of delay of gratification, however, attention to the later goal would undermine delay. Support for the proposition that attention to later goals undermine delay of gratification is mixed. On the one hand, Mischel and Ebbessen (1970) found that children ($N = 32$) assigned to one of four conditions delayed most when no reward was present. They delayed less when either the immediate or delayed reward was present. They delayed least when both rewards were present. On the other hand, Patterson and Carter (1979) varied whether 40 children had the delayed reward immediately present (and presumably salient in attention) or absent. They also varied whether children filled the time interval simply waiting or engaging in "work" related to later reward. When their task was merely to wait, they delayed longer when the reward was absent. When they were required to work in the interval, however, children delayed longer when the reward was present. It is possible that the reward present acted as an incentive, providing a justification for effort, at least in the work condition. Furthermore, Fry and Preston (1980) randomly assigned 308 fourth graders to conditions in a complex experiment. Like Patterson and Carter, they found that delay was greatest when task performance ("work") was required and the task was similar to the delayed reward. These outcomes are inconsistent with a direct attention-distraction explanation.

Mischel et al. (1972) moved from attention analysis to an affect–cognition analysis. What seems to be important is the exact activity occurring in the delay interval. In three studies, children were directly tutored on deploying a cognitive activity during a delay interval. When the reward is not immediately present, children are better able to delay by "thinking of something fun," or without specific instructions, relative to children who are instructed to "think about the reward." When the reward is immediately present, however, thinking about something fun is the most effective way to delay, relative to when children are given instructions to think about something sad, given a toy with which to play, given instructions to think about the rewards, or given no instructions.

Peake, Hebl, and Mischel (2002) repeated the Patterson and Carter (1979) study, but added a measure of spontaneous attention to determine whether distraction, particularly through work, was the primary explanation for children's enhanced delay. When preschoolers were assigned to wait alone, they delayed less when the reward was present than when it was absent. Study 2 examined if work engagement was a predictor of preschooler's delay. When children were assigned to a situation with a reward immediately present and also had engaging work, they looked at the reward less and waited longer than when they were simply asked to wait.

Another study examined affective and cognitive aspects of delay, adding a developmental dimension. Yates, Lippett, and Yates (1981) found that preschoolers were better able to delay gratification when they were induced to think about three things that made them happy and were then prompted to think about them during delay tasks. Preschoolers who were instructed to think about three things that made them happy plus instructions to use those thoughts during delay performed significantly better than children in the other two groups. Outcomes suggested that children at this stage of development will perform better when explicitly instructed to engage in distracting thoughts. School-aged children, in contrast, performed equally well in the positive affect induction and positive affect induction plus cognitive instruction condition relative to the control condition, indicating that children slightly further along in development are able to use the affect induction experience to better their performance without any direct instruction.

Nisan and Koriat (1984) conducted a two-study set examining cognitive-developmental theory in relation to delay of gratification. In the first study, they found that kindergarteners were more likely to switch their choice of an immediate smaller reward to a larger delayed reward when they were induced to generate reasons for choosing the larger delay reward choice, but not when they were merely told that other children chose the larger delayed reward. The second study examined the relative effectiveness of objective-rational and subjective-emotional arguments in influencing short-term and long-term (three weeks later) reward decisions. Kindergarteners who employed the objective-rational argument were more effective than those who used the subjective-emotional one, particularly when the argument supported a delayed reward relative to an immediate one.

Going a bit further into the cognitive realm, Saltz, Dixon, and Johnson (1977) examined the role of fantasy in delay of gratification. They found that children who were instructed to think about their favorite story while waiting performed better in delay tasks than did those who were not. Children who were trained in thematic-fantasy or sociodramatic play were also better able to delay than children who were exposed to fantasy discussion and those in the no-training control condition.

Fantasy played an important role in psychodynamic theory. The focus of the psychodynamic interpretation of fantasy was not on the unreal aspect as much as on the symbolic representation aspect. Delay of gratification researchers in the social learning theory tradition explored the role of symbolic rewards as part of the link between cognition and performance. In contrast to previous findings, Mischel and Moore (1973)

found that preschoolers were better able to delay gratification when they were provided with symbolic representations of the rewards (projected images on slides) than when they were exposed to irrelevant images or blank screens. They interpreted these findings to indicate that children's ability to delay gratification is enhanced by abstract representations, but not by concrete ones such as having the items physically present. Even more striking, Moore, Mischel, and Zeiss (1976) found that children who were instructed to transform physically present rewards into pictures cognitively were able to delay gratification as long as children who were merely exposed to images of the rewards. Conversely, when children were instructed to transform pictures of reward items into actual rewards in their minds, their delay of gratification was significantly reduced relative to children who were instructed to do the opposite. These findings suggest that cognitive processes can override children's decreased delay of gratification when in the presence of rewards. Yet another study examined children's preferences for the presence of real or symbolic rewards. That is, Yates and Mischel (1979) found that preschoolers, unlike first through third graders, preferred to view real rewards rather than photographs of them, even though doing so makes it more difficult to delay gratification.

### *The Hot–Cool System*

Metcalfe and Mischel (1999) proposed a model for integrating affective and cognitive processes, with implications for delay of gratification. They propose two representational systems, one "hot" and the other "cool." The hot system provides the basis for emotionality, including fears and passions. It is impulsive and reflexive. It undermines efforts at self-control. The cool system is cognitive, emotionally neutral, contemplative, and strategic. The two systems interact through "hot spots" and "cool nodes." This system was used to explain retrospectively the outcomes of previous research on delay of gratification by Mischel and his colleagues. For example, Prediction 1 in Metcalfe and Mischel states that when the hot system is dominant, salient exposure to the hot stimulus will tend to elicit the relevant (nondelay) response. Thus the authors posit that activation of the hot system (in the absence of cool system activation) accounts for the repeated findings in the delay of gratification literature that children's ability to delay is reduced when the rewards are physically present (e.g., Mischel & Ebbesen, 1970; Patterson & Carter, 1979).

The hot–cool distinction is appealing as part of a preliminary descriptive system. As a theoretical model, however, it requires further development. First, the system is descriptive and denotative, rather than explanatory. No mechanisms of transformation or change are included. Constructs are not assessed easily or separately from each other. For example, Prediction 1 states that salient exposure to a hot stimulus leads to nondelay responses, but the only way we can know that the hot system was dominant is from observing the nondelay response. Similar arguments can be raised about the operation of the cool system, and its ability to distract and draw attention away from a salient goal or reward. Block (2002) raised other criticisms of the hot–cool

system including its lack of differentiation from other systems. Overall, the hot and cool systems bear an uncanny resemblance to Freud's id and ego, respectively.

### *Delay Discounting*

This review did not include papers focused primarily on economic theories. However, one potentially important issue involves quasi-economic changes in the values of rewards over time. The theory most immediately relevant to the present analysis comes from George Ainslie's reductionistic *Breakdown of Will* (2001), which was based on his earlier technical work *Picoeconomics.* (See also Ainslie, 2006.) Ainslie notes that an extensive literature shows that both people and animals differentially value future goals proportional to their delays. Future goals are given less value (discounted), but how? Is this discounting an innate product of mammalian evolution or is it an artifact of cognitive architecture? Ainslie does not think so. He draws on the distinction between exponential and hyperbolic discounting. In exponential discounting, a constant proportion of the utility value is subtracted in relation to a time delay. Drinking a bottle of whiskey could be worth 100 units of happiness ("utiles") today, but only 80 utiles tomorrow, and 60 the day after tomorrow, assuming a 20 unit discount rate. More happiness utiles can be expected to come from drinking the whiskey now than in downing it tomorrow. The problem with this form of discounting is its difficulty in explaining swings and instability in choices, described as "dynamic inconsistency" in economics. For Ainslie hyperbolic discounting is the main alternative. Hyperbolic discounting is maximally different from exponential discounting, not at the extremes of the delay interval, but in the middle. The discounting curve is more sharply bowed. On its face, hyperbolic discounting seems irrational, and makes the hyperbolic discounter vulnerable to exploitation by exponentially discounting peers. The process that helps make the phenomenon explicable is higher-order cognitive self-attributions. Choices that pay off quickly tend to be preferred, at least temporarily, over seemingly more valuable choices that pay off more slowly. However, when people are induced to look at their current choices as diagnostic of future choices, additional incentives come to be recruited to the later, seemingly more valuable, choice. The choice can become more valuable as a precedent than as an event in itself.

Ainslie's theory is relatively new, and further clarifications and development are needed. Because its propositions have not been explored systematically, as of this writing it is difficult to know how well it models processes of resistance or delay.

## Toward a Process Theory of Delay of Gratification

None of the available theories of motivation appear to explain delay of gratification in a comprehensive, integrative system. Much of the existing research is denotative,

descriptive, and vague in explicating causal mechanisms or mechanisms of transformation from one state to another. The literature primarily points to certain variables and situations that affect delay. Important core questions are not addressed, much less answered. First, as part of his generalized critique of Aristotelian thought, Lewin (1935, 1951, 1987) and others (e.g., Batson, 1991; Cassirer, 1950; Graziano & Waschull, 1995, pp. 234–236) noted the error in segregating and categorizing psychological activities, particularly into "higher" and "lower" levels. In this spirit, we propose that delay of gratification is necessarily part of a larger system of psychological functioning, including basic acts of categorization and psychological development. That conceptualization implies that fundamental aspects of psychological development, like categorization skills and the perception of time and cause, should participate in major ways in the expression of delay.

What are the essential elements or processes without which delay of gratification could not occur? Let us refer to this as "basic delay." At a bare minimum, two components are needed. One is a device that is responsive to time, in terms of its duration, locating events within a sequence or interval. Second is a device that is responsive to differences in goals and rewards. Responsive here means detection or recognition, not differential valuation. The third device assigns valuation to the goals and rewards. Each of these three basic devices could exhibit developmental patterns and individual differences in their operation. Of course, each device would depend on its own set of specific variables and provide feedback to each other. For example, any event that influenced the perception of time could influence the valuation of goals, but probably not the recognition of differences between two goals. Basic delay does not require that any of the three components be in awareness, be effortful, or even be open to the perception of volition (e.g., Gilbert, Brown, Pinel, & Wilson, 2000; Rosati et al., 2001; Wegner, 2002).

Figure 3.1 presents the basic delay approach schematically in structural terms. In brief, basic delay consists of three distinct components: (a) detection and recognition of event sequencing and the embeddedness of events within time; (b) events (including rewards and goals) are categorized as the same as or different from each other; and (c) some events are preferable to others. The three components are arranged hierarchically. Detection of sequencing and time are foundational. Categorizing of events and goals into different groups could not occur without it, and it may emerge developmentally earlier than the other two components (Baird & Baldwin, 2001; Graziano, Moore, & Collins, 1988). Time sequencing may or may not require repeated exposure to acquire (e.g., Piaget's, 1954, primary circular reactions; Meltzoff & Brooks, 2001; cf., Amsel, 1992, on dispositional learning), but basic delay does not require a stand on the issue. Once events, goals, and rewards are embedded in time and categorized as different from each other, valuation can be associated with them.

Figure 3.2 presents basic delay in terms of processes. Time extends horizontally with time markers placed at various intervals along the time line as $T_1$, $T_2$, $T_3$, . . . $T_n$. Large vertical arrows are placed along the line reflecting the differential categorization of the events. Category 1 need not occur in close temporal proximity with Category 2, but

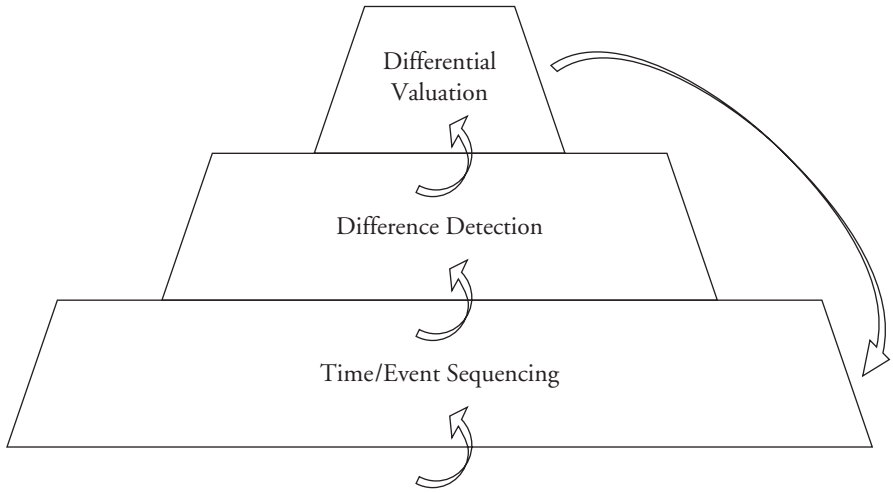


**Figure 3.1.** Components of basic delay.

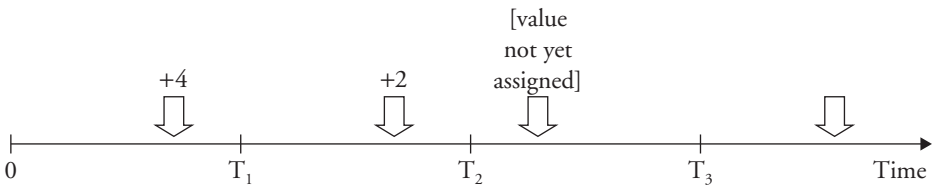


**Figure 3.2.** Processes underlying basic delay.

if they are not close, repeated exposure to both event categories may require repeated encounters with them to differentiate between them. The plus signs (+) above the large arrows shows the valuation assigned to the events and goals. Some goals and events have not yet received a valuation due to limited exposure, or lack of relevance to ongoing behavior. A dynamic element is added that permits the three components to influence each other. For example, a high evaluation assigned to one goal may induce more extreme categorization at the lower level, sharply differentiating the most preferred goal category from other categories, or reducing the total number of categories. For another example, if the intervals in the passage of time were altered, or if the sequence of events is detected as altered, then categorization of events as similar or different could be affected. This in turn could affect the differential valuation of goals and rewards.

Several studies provide data that are consistent, but not diagnostic, regarding the propositions. Using fMRI, Eisenberger, Lieberman, and Satpute (2005) showed that events categorized as expected or similar activate different areas of the frontal cortex than events categorized as unexpected or different. Apparently, the categorization by itself is not sufficient to activate differential behavior. Neural impulses associated with

the categorization information are sent to an area of the brain that is related to differential behavior. In a somewhat different vein, Witt and colleagues (Witt & Proffitt, 2005; Witt, Proffitt, & Epstein, 2004, 2005) showed that even object perception can be affected by functional considerations. For example, the same object in the environment can be estimated at different distances from the self depending on the object's use to the observer. Beyond the different estimates (categorizations?) of distance perceptually, perceivers show different actions depending on the perceived distance. Tossing a ring over a peg will be based on different patterns of exertion and motor behavior depending on the initial categorization.

If the Eisenberger et al. (2005) and Witt et al. (2004, 2005) analyses apply more generally, then what is needed next is a device that connects categorization and valuation to overt action (i.e., delay choice). That this is a particularly difficult nut to crack is evidenced by the absence of any specific mechanism or device of this sort in previous theory or research. The common assumption is that once a reward or goal is assigned a value (including devalued), action necessarily follows as a consequence. Phrased in such bald terms, the necessity or inevitability of this valuation–behavior link is implausible. This suggests that one other aspect of delay needs attention, namely predictable unpredictability of choices. In economics, the intraindividual variability called "dynamic inconsistency" represents a nuisance rather than an opportunity for theory development. Put simply, is the variability or instability of delay choices a structure, or is it random?

One possible avenue lies in Ainslie's (2001, 2006) discussion of hyperbolic functions of valuation. At this juncture, however, processes of cognitive inference can make important contributions. If the choice of a given reward or goal is interpreted as predictive or diagnostic of an aspect of the self, then the probability of delay is enhanced. The tendency to make performance-related self-attributions is probably a relatively late acquisition developmentally (Eisenberg, Cialdini, McCreath, & Shell, 1987). The persons without this developmental acquisition will behave differently from those who do have it. From a differential perspective, people will also differ in their tendencies to make self-attributions from action choices (e.g., defensiveness, self-favoring biases; Paulhus & John, 1998).

Despite at least 50 years of sustained theory development and research, many important questions about delay of gratification remain unanswered. Many of these are fundamental issues. Among the issues crying out for clarification are these: Is delay of gratification primarily the outcome of a conflict between separate cognitive and emotional systems? This is a nearly universal assumption. Are the choices of a smaller but immediate reward necessarily irrational? The answer seems to be no, but then what are the key variables that make delay less rational? What are the best ways to explain the instability of delay choices ("dynamic inconsistency")? To what extent does the instability of delay choices implicate more general individual differences in personality and motivation? Do personality and individual differences in patterns of delay of gratification implicate systematically different processes of motivation and cognition, or do they merely reflect differences in levels (e.g., Jensen-Campbell & Graziano, 2005)?

Is delay of gratification a reflection of other more foundational developmental cognitive processes like categorization, and the acquisition of the perception of time and causation? It is not difficult to imagine programs of correlational and experimental research to address these questions. In terms of opportunities, the future for delay of gratification research looks promising.

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# 4

# *Self-Regulation as the Interface of Emotional and Cognitive Development*

## Implications for Education and Academic Achievement

**Clancy Blair, Susan Calkins, and Lisa Kopp**

This chapter reviews research on the development of self-regulation in young children and considers its relation to early achievement in school. Self-regulation is of strong interest to educators and education researchers due to its demonstrated role in academic achievement (Pintrich, 2000; Schunk, 1999). Using social-cognitive theory (Bandura, 2001), educational psychologists have shown that children's self-regulation skills and academic achievement are reciprocal and mutually reinforcing (Elliot & Dweck, 1988; Skinner, Zimmer-Gembeck, & Connell, 1998; Zimmerman, 1995). For example, studies examining children's perceptions of control over success and of success as being controllable by effort, as opposed to ability, have shown that self-regulated learning increases perceived control and efficacy, and thereby positively influences academic achievement (Fuchs et al., 2003; Zimmerman & Kitsantas, 1999).

Given evidence for a role for self-regulation in academic achievement, we are interested in factors that contribute to self-regulation development early in life. In pursuing this interest, we generally follow current perspectives on trait versus state, or trait versus information-processing approaches to personality development (Hoyle, 2006) and consider personality within context (Roberts, 2007). These perspectives suggest that personality traits associated with self-regulation have a constitutional basis but develop dynamically in relation to experience (Mischel & Shoda, 1998; Rothbart & Ahadi, 1994). Accordingly, we first present a definition and theoretical framework for the study of self-regulation in young children that considers the ways in which a central organizing concept in personality research, approach–withdrawal motivation (Carver & White, 1994; Schneirla, 1957), defined as biologically based tendencies to

approach or avoid stimulation, is related to the development of higher order cognitive control abilities termed executive functions. In doing so, we present a neurobiologically based general theory of the development of self-regulation that we then apply to the context of early schooling and to current and future research directions in the promotion of self-regulation development in children.

## A Definition and Organizational Approach

Regulation generally speaking can be defined as a process through which one system or domain of psychological functioning modulates the level of another in order to maintain an adaptive balance or equilibrium in response to internal or external stimulation. As such, regulation is perhaps best characterized as a cybernetic process of adaptive homeostasis, or allostasis (Luu & Tucker, 2004). Strictly speaking, allostasis refers to the flexible and coordinated adjustment of basal levels or set points in physiological stress response systems in order to meet environmental contingencies and physical and social demands of a given context. Accordingly, allostasis is an adaptive process whereby system set points are modified over time in order to meet *anticipated or expected* demands (McEwen, 2006). When expected demands are well within the range of systems' capacities to respond to them, these systems are healthy and function at optimum set points; they are able to react in response to stress and then return to basal levels once challenge has been met. Through repeated adjustment in high stress environments, however, adaptive set points are thought to reach basal levels that are not optimal for stress responding and that are ultimately injurious to the organism, resulting in physical and mental disease due to the toll, or wear and tear, they exact on the body's various systems (McEwen, 2000).

Although originally developed to describe the process of the physiological response to stress and the occurrence of stress-related disease, the concept of allostasis is relevant to understanding self-regulation from psychological and behavioral points of view (Luu & Tucker, 2004). From the standpoint of allostasis, self-regulation can be defined as the processes by which the individual actively maintains set points or levels of emotional and cognitive arousal that promote positive adaptation and that lead to the development of a positive sense of efficacy, agency, and self-worth. Importantly, within such a framework, the process of self-regulation can be understood not as the result of external, homuncular control but represents a process through which lower level systems of arousal engage, influence, and ultimately are influenced by the functioning of higher order cognitive control systems that result in motivated behavior (Luu & Tucker, 2004).

As the product of multiple interrelated systems, self-regulation is best understood within an organizational perspective on development. The organizational perspective emphasizes the idea that the psychological and behavioral development of the individual is determined by the combined influence of functions and processes of various

systems operating at distinct levels of analysis (Cicchetti & Tucker, 1994; Derryberry & Reed, 1996). These systems range from those associated with gene expression and gene regulation at the molecular level to those associated with norms, rules, and standards governing social interaction and social behavior at the cultural-institutional level of analysis. In the organizational approach, the functioning of a system at a given level is understood to be probabilistically determined by the influence of the components of the system at that level at a given time point, but also by the functioning of components of systems at other levels at antecedent time points (Gottlieb, 1983).

A hypothetical example of an organizational process in the development of self-regulation can be seen in the scenario in which the probability of externalizing types of behaviors indicative of problems with the self-regulation of frustration and anger arousal is increased in a child with particular genetic, neural, and physiological characteristics that predispose to higher levels of angry emotionality and impulsive behavior (Caspi et al., 2003). This increased probability of problem behaviors is dependent in part on the extent to which the child's behavior impacts relationships with parents, peers, and teachers in various contexts. That is, when the child's behaviors elicit reactions from individuals that exacerbate the child's difficulties with self-regulation, either through excessive coercion or accommodation, these interactions help to promote and maintain a developmental course of poor regulation. In turn, repeated difficulty in the adaptive regulation of behavior in interactions with others is thought to lead the child to develop representations of the self as one who is ineffective in regulating behavior appropriately in ways demanded of a particular context. In contrast, when a child with the same relation of biology to behavior is situated within a context that provides the necessary structure for attempts at self-regulation in appropriate and positive ways, the probability of developmental difficulty is lessened and that child is more likely to develop representations of the self that promote self-regulation and the effective and positive negotiation of contexts and situations that present regulatory challenges.

Our interests in this chapter concern developmental relations between biologically based approach–withdrawal tendencies for which the neural substrate is primarily subcortical in origin, and the ways in which these tendencies influence and are influenced by the development of higher order cognitive control abilities for which the neural substrate is primarily cortical in origin. The relation between relatively fast and automatic information processing in the approach–withdrawal system and relatively slow and effortful information processing in the cognitive control system can serve as a focus for research on self-regulation development in children (Derryberry & Rothbart, 1997; Posner & Rothbart, 1998). In particular, this dichotomy can be seen to underlie the two major perspectives through which self-regulation development has been studied. One is in research on temperament and the development of a dimension of temperament referred to as effortful control (Kochanska, Murray, & Harlan, 2000; Rothbart & Bates, 2006). The other is represented in the study of aspects of cognitive development referred to as executive function that focuses on specific information-processing abilities that contribute to the effective regulation of

behavior (Diamond, 2002; Luciana, Conklin, Hooper, & Yarger, 2005; Miyake, Friedman, Emerson, Witzki, & Howerter, 2000). A primary interest in this chapter concerns the extent to which research in each of these traditions provides information regarding developmental plasticity in self-regulation relevant to early experience in school.

## Temperament

Research on the temperamental basis for self-regulation has primarily been conducted within the model of Rothbart and associates (Rothbart & Bates, 2006; Posner & Rothbart, 2000) in which developing temperament is understood to reflect constitutionally based individual differences in emotional reactivity and in the regulation of this reactivity. This model provided a framework for understanding self-regulation in the form of the construct referred to as effortful control (Rothbart & Ahadi, 1994). In the model, early predispositions to level of emotional reactivity to stimulation in infancy precede the development of the effortful control of emotionality, primarily but not exclusively through the control of attention (Ruff & Rothbart, 1996). Accordingly, temperamental emotionality in the child provides something of a platform or starting point for understanding the processes through which individual differences in self-regulation and personality develop and become increasingly stable in early childhood. Achieving a stronger theoretical understanding of the nature of temperamental traits is an important first step in developing predictions of how these traits interact with higher order cognitive control and environmental context to influence developing self-regulation. Ultimately such knowledge can be used to develop biologically informed prevention and intervention programs to promote the development of self-regulation.

### *Approach and Withdrawal*

A foundational aspect of the constitutional basis for developing arousal and emotionality in the study of temperament is provided by research on the neurobiology of approach–withdrawal behavior (Gray, 1987) and behavioral inhibition (Kagan, 1998). Failures of self-regulation can be but are not necessarily seen as extreme manifestations of poorly regulated approach or withdrawal tendencies. Even from infancy, children vary in their patterns of response to stimuli, such as the threshold for crying. Parents vary, however, in their response to the infant's behavioral signals, such as the latency to soothe the child, and it is in the interaction between child and parent behavior that self-regulation in the child develops (Calkins, 1994; Feldman, Greenbaum, & Yirmiya, 1999; Kochanska et al., 2000; Stifter, Spinrad, & Braungart-Reiker, 1999).

Temperamental traits are associated with basic motivational systems (Calkins, Fox, & Marshall, 1996) that are foundational constructs in personality research (Carver, Sutton, & Scheier, 2000). These systems include the behavioral inhibition system (BIS), responsible for interrupting ongoing behavior when confronted with novel, unfamiliar, or aversive stimuli; the behavioral approach system (BAS), mediating response to rewarding or appetitive stimuli; and the fight or flight system (F/F), engaged during perceived threat (Gray, 1987). In addition to these primary motivational systems, the polyvagal system, known to be important for emotion regulation, is of further importance in conceptualizing regulatory ability and approach–withdrawal motivation (Porges, 2003). Importantly, as the primary motivational systems have been shown to bear on emotional experiences, they also play an integral role in cognitive functioning that supports regulation, namely the control of attention (Gray, 1990). As such, individual variation in these systems has been documented and associated with psychopathological outcomes (Calkins & Degnan, 2006), such as anxiety disorders; however, the typical or normative relation of the motivational systems to the development of attention control and related aspects of cognition has been less well characterized, a theme we develop in this chapter.

*BIS.* The BIS system constitutes a primary focus of Gray's work and, as a consequence, the functional implications of this system have been well delineated. BIS activity is invoked in response to environmental cues that predict punishment or nonreward or in situations of novelty when the predictive value of stimuli is unknown. The BIS system functions to inhibit ongoing behavior and reallocate attentional resources to the novel stimuli. This provides the advantage of focusing attention on stimuli that predict negative outcomes so that appropriate behavioral decisions can be made. Neural circuits mediating this activity include cholinergic neurons of the septohippocampal system and its connectivity with the circuit of Papez, and the prefrontal cortex (Gray, 1987).

BIS function is highly associated with "inhibited" temperaments in younger children and with the personality trait of "harm avoidance" (Mardaga & Hansenne, 2007). Behaviorally, activation of the BIS is thought to underlie manifestations of anxiety (Gray, 1987). Although the BIS is considered to increase attentional allocation, in extreme cases this increase may also come with a redirection of attention in ways that interfere with effective cognitive and behavioral functioning in a given situation. For instance, an individual with high BIS activity is likely to have an increase in selected attention toward potentially anxiety-producing stimuli. A child who is hypervigilant to cues that a teacher may be about to call on him or her to speak in front of the class would redirect attention away from the content of the teacher's lesson and toward arousal associated with the prospect of public speaking, despite the fact that resources devoted to attention are actually quite high.

*BAS.* The behavioral approach system facilitates the exertion of energy resources in the pursuit of a reward or reinforcement. Likewise, this system is involved in activating

behavior necessary to escape punishment, owing to the reinforcing properties of escape. BAS function derives from activity in dopaminergically rich networks in the ventral tegmental area and ventral striatum (Gray, 1987) and the cortical-striatal-thalamic-cortical loop system associated with orbitofrontal cortex (Depue & Collins, 1999), all of which also have extensive reciprocal connections to structures of the prefrontal cortex linked with higher order cognitive processes associated with goal-directed planning and problem solving. These structures have been well characterized in their roles of motivating reward-seeking behavior, sometimes referred to as "wanting" (Berridge & Robinson, 2003) or the instigation of behavior in the anticipation of a reward.

Behaviorally, BAS activation has been associated with positive affect in anticipation of goal achievement and is related to the temperamental trait in children referred to as surgency (Rothbart & Bates, 2006). However, approach motivation is not restricted to positive emotionality and may include negative affect such as anger when anger is instrumentally conducive to achieving a goal (Harmon-Jones, 2004). Most frequently measured through self-report scales of behavioral tendencies, BAS activation has been associated with personality and psychopathology variables. When measured in normative samples, BAS motivation is associated with extroverted personality traits (Muris, Meesters, de Kanter, & Timmerman, 2005) and low levels of negative affect (Coplan, Wilson, Frohlick, & Zelenski, 2006). However, function at either extreme of BAS motivation has also been associated with various expressions of psychopathology. Low BAS motivation is thought to underlie the anhedonic traits of depression (Hundt, Nelson-Gray, Kimbrel, Mitchell, & Kwapil, 2007), whereas high scores of BAS motivation are often associated with externalizing behaviors including hyperactivity and substance abuse (Hundt, Kimbrel, Mitchell, & Nelson-Gray, 2008).

*Relations between BIS and BAS.* Variation in the function of the BIS and BAS systems likely spans the entire range from functional/adaptive to psychopathological depending on the degree of activation, the context specificity of activation, and the coordination that activation shows with activation in other systems, particularly those associated with the control of attention and higher order cognition. Because BIS and BAS function through distinct neural circuits, they are characterized as operating on independent axes rather than opposite ends of a single continuum. For instance, individuals can exhibit a high BIS as well as a high BAS or vice versa (Blair, Peters, & Granger, 2004). Despite the fact that these systems function through independent neural circuits, a cooperative relationship is presumed. For instance, upon being presented with a dog, the child may freeze and scrutinize the dog for some time. In such a case, BIS activity is inhibiting any ongoing behavior and temporarily dominating the system. Over time, the balance between the BIS and BAS function may shift as the infant slowly approaches the animal. However, the dissociation between BIS and BAS function may characterize some individuals and may be predictive of vulnerability to psychological problems. For instance, researchers suggest that psychopathy is not characterized solely by insensitivity to punishment, but rather by an inability of the BIS to intrude upon BAS function once an appetitive goal has been established (Newman

& Kosson, 1986). In other words, the dysfunction lies in the interaction between the two systems rather than the activity of either independent system.

## *Emotion Regulation*

*The vagal system.* An important complement to variation in BIS and BAS concerns the ability to manage arousal, particularly emotional arousal. The ability to regulate one's emotions is a critical achievement of early childhood (Calkins & Howse, 2004; Eisenberg et al., 2001; Sroufe, 1996). The normative development of emotion regulation in young children has been studied extensively, as has the link between young children's ability to regulate their emotions and their successful adaptation in later childhood. This research indicates that deficits in emotion regulation are linked to greater levels of behavior problems, difficulties with peers, and a higher risk for later psychopathology (Calkins, Gill, Johnson, & Smith, 1999; Eisenberg et al., 2001; Keenan, 2000; Shipman, Schneider, & Brown, 2004). Conversely, better emotion regulation has been linked to higher academic achievement (Gumora & Arsenio, 2002; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003).

Recent theoretical frameworks conceptualize emotion regulation as a process in which emotional reactivity is viewed as a dimension of, but still distinct from, efforts to manage it (Calkins & Johnson, 1998; Fox & Calkins, 2003). During an emotional experience, reactivity reflects the characteristic threshold, intensity, and duration of affective arousal (Rothbart & Bates, 2006). Regulation has been conceptualized as the behaviors, skills, and strategies, whether intrinsic or extrinsic, automatic or effortful, that modulate, inhibit, and enhance that reactivity in order to meet situational demands and achieve personal goals (Calkins & Hill, 2007; Cole, Martin, & Dennis, 2004; Gross &Thompson, 2007). Emotion regulation processes are embedded within the larger construct of self-regulation. Some researchers have proposed that children's self-regulatory processes are hierarchically organized and interdependent, including physiological, attentional, emotional, behavioral, cognitive, and social processes (Calkins & Fox, 2002). From this perspective, children's observable strategies and behaviors during emotionally arousing situations reflects their functioning across these multiple levels.

Fundamental to a hierarchical and organizational conceptualization of the regulation of emotion is the notion that a range of adaptive regulatory functions are supported by basic biological processes. Such a hypothesis has support in work conducted within a number of related research traditions. So, for example, in both the child and adult personality and psychopathology literatures, a number of studies suggest links between biological functioning and psychopathology characterized by deficits in regulatory skills (Crowell, Beauchaine, Theodore, & Gatzke-Kopp, 2006; Curtis & Cicchetti, 2003; Rottenberg, Salomon, Gross, & Gotlib, 2005).

We focus on the important role of biological functioning in the development of adaptive behavior, particularly well-regulated emotion and behavior, as a resilience

mechanism in both internalizing and externalizing problems in children (Calkins & Dedmon, 2000; Calkins, Graziano & Keane, 2007; Calkins & Keane, 2004). In doing so, we focus on the polyvagal system (Porges, 1996, 2001, 2003; Porges, Doussard-Roosevelt & Maita, 1994) and Porges's polyvagal theory, which describes the function of biological maturation, specifically maturation of the parasympathetic nervous system, as playing a key role in regulation of state, motor activity, attention, and emotion. Porges notes that individual differences in nervous system functioning might mediate the expression and regulation of emotion and, by extension, be an important element of the system that supports appropriate social engagement and positive adjustment (Porges, 2001, 2003; Porges et al., 1994). Porges and others have found that parasympathetic nervous system functioning, as reflected in heart rate variability influenced by the vagal system, is related to the control of attention, emotion, and behavior (Calkins, 1997; Calkins & Dedmon, 2000; DeGangi, DiPietro, Greenspan, & Porges, 1991; Huffman et al., 1998; Porges, Doussard-Roosevelt, Portales, & Greenspan, 1996). Although there are multiple ways to measure this variability, Porges (1985, 1991, 1996) and colleagues developed a method that measures the amplitude and period of the oscillations associated with inhalation and exhalation. This measure refers to the variability in heart rate that occurs at the frequency of breathing (respiratory sinus arrhythmia, RSA) and is thought to reflect the parasympathetic influence on heart rate variability via the vagus nerve. Levels of baseline, or resting, vagal tone are considered to be a stable neurophysiological mechanism underlying autonomic and behavioral reactivity potential in the absence of environmental challenge.

Porges's theory further suggests that the RSA measure is sensitive to changes in the organism in response to environmental challenge. During situations where active coping or emotional and behavioral regulation is required, the vagal input to the heart is withdrawn and a decrease in RSA is observed, a response that results in greater cardiac output in the form of heart rate acceleration, which supports the coping response. Thus this response is a physiological indicator of the individual's ability to engage in appropriate regulatory behavior (Porges, 2001, 2003). Evidence of vagal withdrawal during demanding tasks, as indexed by a decrease in the RSA measure, may reflect physiological processes that allow the child to shift focus from internal homeostatic demands to demands that require internal processing or the generation of coping strategies to control affective or behavioral arousal. In sum, vagal withdrawal is thought to be a physiological strategy that permits sustained attention and behaviors indicative of active coping that are mediated by the parasympathetic nervous system (Porges, 1991, 1996; Wilson & Gottman, 1996).

Considerable research indicates that greater vagal withdrawal, as measured by a decrease in RSA, during challenging situations is related to better state regulation, greater self-soothing, and more attentional control in infancy (DeGangi et al., 1991; Huffman et al., 1998); fewer behavior problems and more appropriate emotion regulation in preschool children (Calkins, 1997; Calkins & Dedmon, 2000; Calkins & Keane, 2004; Porges et al., 1996); and sustained attention in school-age children (Suess, Porges, & Plude, 1994). Moreover, recent research comparing the magnitude of RSA response

to different types of challenges indicates that children display significantly greater decreases in RSA when provided with parental support during a task than when confronted with a challenge independent of support (Calkins & Keane, 2004), and that the magnitude of this response is an individual difference that is moderately stable across early development and that predicts a range of indicators of adaptive functioning (Calkins & Keane, 2004; El-Sheikh, 2005). Finally, in recent research examining the trajectories of problem behavior across early childhood, it appears that the ability to regulate physiologically is predictive of a general pattern of decline in externalizing problems (Degnan, Calkins, Keane, & Hill, 2008) and increases in emotion regulation skills (Blandon, Calkins, Keane & O'Brien, 2008).

*The early environment.* Although psychophysiological processes have been the focus of recent work on the changing patterns of behavior problems over time, this emphasis is relatively recent. Traditional approaches to understanding pathways of problem behavior have emphasized the role of compromised and nonoptimal family processes (Cummings, Davies, & Campbell, 2000). Indeed, the study of early childhood behavior problems has focused on a number of indices of the parent–child relationship as predictors and risk factors in the emergence and maintenance of such problems. For example, a number of studies have shown that insecure infant attachment is predictive of later behavior problems in children (Booth, Rose-Krasnor, & Rubin, 1991; Goldberg, Gotowiec, & Simmons, 1995; Lyons-Ruth, Alpern, & Repacholi, 1993; Renken, Egeland, Marvinney, Mangelsdorf, & Sroufe, 1989; Shaw, Owens, Vondra, & Keenan, 1996; Shaw et al., 1998). In addition, a considerable body of evidence indicates that preschool children are more likely to show overactive, noncompliant, aggressive, and impulsive behavior when their parents are displaying negative control and are uninvolved, rejecting, and harsh (Campbell, 1995; Dumas & LaFreniere, 1993; Hart, DeWolf, Wozniak, & Burts, 1992; Pettit, Bates, & Dodge, 1993).

In addition to having insecure mother–child attachment histories and negative, controlling parents, children displaying behavior problems have also been found to have less harmonious mother–child interactions (Gardner, 1987, 1989, 1994) and are low on affection, positive involvement, and warmth (McFadyen-Ketchum, Bates, Dodge, & Pettit, 1996; Miller, Cowan, Cowan, Hetherington, & Clingempeel, 1993). In other studies, mother–child relationships where the children are displaying behavior problems have been characterized by conflict and coercion. Patterson has identified a pattern of coercive interaction between mothers and children, where both the mothers' and children's aversive behaviors are reinforced and escalate as a result of this reinforcement (Patterson, 1982; Patterson, DeBaryshe, & Ramsey, 1989). Finally, mothers of children displaying behavior problems have been found to be more adult-focused by controlling and dominating activities with their children instead of being child-focused and encouraging actions initiated by the children (Gardner, 1994; Rubin, Booth, Rose-Krasnor, & Mills, 1995).

One hypothesis consistent with the organizational approach to development is that parents are proximal influences on children's emerging ability to regulate affect and

behavior. Indeed, the development of children's emotion regulation is embedded within the family socialization context and children's early social interactions (Cummings, Keller, & Davies, 2005; Rogosch, Cicchetti, & Toth, 2004; Thompson & Meyer, 2007). Caregivers are a critical external factor in infants' emotion regulation as they help them regulate their arousal and emotional states (Calkins, 1994; Kopp, 1989). As children age, sensitive parents adapt their behaviors to the child's developmental needs. Early emotion regulation is often conceptualized as dyadic or mutual rather than arising solely from the infant (Gianino & Tronick, 1988). For instance, parents generally monitor their infants' environment so that the situational demands are developmentally appropriate and provide support and assistance such as distraction or soothing when their infant is distressed (Thompson & Meyer, 2007). Research suggests that parents' direct intervention tends to decrease as children's regulatory capacities increase. For example, Grolnick, Kurowski, McMenamy, Rivkin and Bridges (1998) found that parents were less likely to intervene during an emotionally challenging task for the child by actively engaging their children in another task when the children were 32 months than at earlier assessments. As children develop, parents may also monitor their child's environment, but rather than always intervening to alleviate the distress parents may suggest specific ways in which children can manage their own emotional responses, such as giving them suggestions for how they can distract themselves. It is during these interactions that children are able to learn skills and strategies for dealing constructively with their emotional states to meet different situational demands (Calkins & Hill, 2007). An important question not well addressed is the degree to which parenting behaviors interact with children's own developing biological capacity for self-regulation.

## Executive Function

Ultimately individual variability occurs in the primary motivational, emotion arousal, and emotion regulation systems and in the dimensions of early parenting that provide for the socialization of arousal and self-regulation. An additional and related source of variability in the development of self-regulation concerns the maturation and function of higher order cognitive systems, referred to as executive function or cognitive control systems. The ability to incorporate systematic cues from the environment so that behavior can be maintained over periods without immediate reinforcement, to inhibit automatized or prepotent responses to stimulation, and to maintain a set rule structure to guide behavior internally, are key characteristics of executive function systems (Freidman et al., 2006; Luciana et al., 2005; Luu, Tucker, & Derryberry, 1998).

As noted above, the focus of research on the regulation component of the model of temperament, referred to as effortful control, has been on the control of attention (Posner & Rothbart, 2000). During the second and third years, children acquire a voluntary attentional system that enables them to use deliberate and effortful attentional strategies (Walden & Smith, 1997); these changes in the planful control of

attention undoubtedly contribute to goal-directed behavior in both the emotional and cognitive spheres, skills that translate into successful social and academic outcomes. As such, control of attention is an important, perhaps foundational, component of the three central information-processing aspects of executive function: inhibitory control, working memory, and mental flexibility (Diamond, 2002; Zelazo & Müller, 2002). Inhibitory control refers to the ability to override a previously well-learned or automatic stimulus–response association in favor of a subdominant response. Working memory refers to the active maintenance of information in short-term store for the purpose of executing a task specific goal. And mental flexibility refers most directly to the switching of the focus of attention or cognitive set between distinct but often closely related aspects or dimensions of a given object or objects within a task (Davidson, Amso, Anderson, & Diamond, 2006; Miyake et al., 2000; Zelazo & Müller, 2002).

The role of executive function in the development of self-regulation is of strong interest given the extent of its developmental change occurring over both childhood and adolescence (Davidson et al., 2006; Luciana et al., 2005). Intervention on behalf of this development may be beneficial in shaping approach–withdrawal and temperamental variation into effective and prosocial outcomes. However, to date this hypothesis has seen limited empirical examination.

### *Neurobiology*

The notion that emotion regulation and executive function are linked developmentally and are functionally interdependent has some support from conceptual and empirical work from a range of perspectives, including developmental neuroscience and psychophysiology. This work highlights the linkages between specific central and peripheral processes that govern affective and cognitive processes and suggests shared neural pathways that support both affect and cognition (Barbas, 1995; Ghashghaei & Barbas, 2001; Morgane, Galler, & Mokler, 2005). For example, one important piece of support for an integrated model of self-regulation that links emotion arousal and regulation with executive functioning comes from recent work in the area of developmental neuroscience that has identified specific brain regions that play a functional role in the deployment of attention and in the regulation and coordination of emotion, cognition, and behavior (Posner & Rothbart, 2000; Rothbart & Sheese, 2007). More specifically, this research has identified areas of the prefrontal cortex as central to interrelations between the effortful regulation of emotion and cognition (Gray, Braver, & Raichle, 2002; Ochsner & Gross, 2005). A highly consistent finding in this research is that a central brain structure in the neural basis for self-regulation is the anterior cingulate cortex (ACC; Allman, Hakeem, Erwin, Nimchinsky, & Hof, 2001; Paus, 2001; Yamasaki, LaBar, & McCarthy, 2002). The effortful allocation of attention in executive cognitive tasks, those that induce interference or conflict between stimulus and response as in incongruent flanker, spatial conflict, or Stroop

color–word trials, is understood to be triggered by the registration of conflict between stimulus prepotency and task response requirements (Botvinick, Cohen & Carter, 2004) or by the registration of errors in responding (Luu, Tucker, Derryberry, Reed, & Poulsen, 2003) by the ACC. This triggering is then thought to call on and engage executive cognitive control functions, namely, working memory, inhibitory control, and mental flexibility (Sohn, Albert, Jung, Carter, & Anderson, 2007).

The evaluative function of the ACC in noting conflict or error and engaging higher order cognitive control processes is of considerable interest in that the ACC is a transitional brain region connecting the limbic structures of emotional arousal and approach–withdrawal behavior with the frontal cortical regions, particularly the dorsal lateral region of prefrontal cortex, associated with executive function (Allman et al., 2001). The ACC is composed of two major subdivisions which participate in distinct neural processing streams (Bush, Luu, & Posner, 2000). One subdivision participates in dorsal lateral stream cognitive and attentional processes and is primarily connected to the prefrontal cortex. A second subdivision participates in a ventral medial, orbitofrontal stream associated with emotional arousal and control processes and is primarily connected with the limbic system and peripheral autonomic, visceromotor, and endocrine systems (Lane & McRae, 2004; Luu & Tucker, 2004).

The functional relation between the ventral medial arousal processing stream and the dorsal lateral cognitive processing stream provides a neurobiological basis for understanding the developmental integration of self-regulatory processes implicated in emotion regulation and executive functioning in childhood (Bell & Wolfe, 2004). In terms of developing self-regulation, key questions concern when and how in development the ACC comes to signal information about conflict and the need for increased cognitive control, how cognitive control may in turn signal the need for increased or decreased arousal, and most importantly how reciprocal relations between arousal and control are established and perhaps reach an allostatic set point that might underlie a particular personality style and propensity for self-regulation. In answering these questions, it would seem to be important to determine if there are individual differences in how arousing error or conflict are, and whether these individual differences in arousal are associated with individual differences in the development of cognitive control abilities. Conversely, it is also important to consider individual differences in cognitive control abilities and arousal processes and to determine the unique contribution that each may make to the development of self-regulation in early childhood. Many important questions remain to be addressed concerning the ways in which processes of approach–withdrawal and emotional arousal are related to processes of cognitive control.

## *Emotion and Cognition in Early Childhood*

Although the empirical literature examining the relations among emotion arousal, emotion regulation, and executive functions is small, the handful of studies investigating

these constructs suggests important links in early childhood. For example, in one recent study of preschool children examining emotion regulation, emotion understanding, metacognition, and executive functioning, a four-factor model specifying four separate domains was the best fit for the data (Leerkes, Paradise, O'Brien, Calkins, & Lange, 2008). However, significant relations between the domains of emotion regulation and executive functioning were observed in this sample of three-year-olds. These data lend support to the notion that emotion regulation and executive functioning are distinct but related sets of process as early as age 3 years.

Additional sources of data also suggest moderate relations of executive function to temperamental effortful control and emotionality in very young children. For example, studies with preschoolers indicate that parental ratings of negative emotionality and approach–withdrawal tendencies are moderately inversely correlated with parent and/or teacher ratings of effortful control and objective assessments of executive function (Blair et al., 2004; Carlson, Mandell, & Williams, 2004; Gerardi-Caulton, 2000; Rothbart, Ellis, Rueda, & Posner, 2003). Similar results in a population-based, predominantly low-income longitudinal sample of approximately 1,200 toddlers have been obtained by Blair and collaborators in which effortful control at age 24 months, as assessed objectively and by parent ratings, was associated with a higher level of attention ability, as assessed by objective and observational measures at 15 months, and lower levels of arousal, as assessed by basal levels of the steroid hormone cortisol at 15 months. Furthermore, using structural equation modeling, these investigators found that attention and arousal partially mediated relations of parenting and the home environment on child effortful control (Blair et al., 2008). However, even when modeling mediational effects of home characteristics and parenting through child attention and arousal, these variables continued to uniquely contribute to child effortful control. These results demonstrate the interrelated nature of influence on early self-regulation in children and are consistent with the Rothbart and Posner conceptual model of temperament outlined above.

## Self-Regulation as a Contributor to Academic Achievement

Research on early predictors of self-regulation development takes on particular meaning in that many self-regulation processes in children exhibit clear relations with school outcomes (Bull & Scerif, 2001; Fuchs et al., 2003; McClelland et al., 2007). Emotion regulation, effortful control, and executive function make unique contributions to adaptation to school and early academic achievement (Blair & Razza, 2007; Howse et al., 2003). Research to date suggests that children who have difficulty regulating emotions may also have difficulty regulating their behavior in a variety of settings, and as a consequence may have difficulty learning and acquiring some of the fundamental social and cognitive skills necessary for academic achievement (Eisenberg, Sadovsky, & Spinrad, 2005; Ladd, Herald, & Kochel, 2006). This may occur through different

pathways. The ability to control emotional arousal allows children to engage in challenging tasks that provide opportunities for using and practicing executive function skills (Calkins & Dedmon, 2000). Furthermore, difficulty in managing emotional arousal may exert its influence on children's school readiness through a biological mechanism in which problems with emotionality limit children's use of higher order cognitive processes important for learning (Blair, 2002). Moreover, children who are skilled at maintaining a positive mood are more capable of completing difficult school-related tasks, which often require executive function such as inhibition, working memory, and planning (Kuhl & Kraska, 1989).

The study of self-regulation in research on effortful control and executive function in young children has important parallels in the study of self-regulation and academic achievement in educational psychology. Research on self-regulation in developmental psychology reviewed above provides some background or foundation for the development of some of the regulatory abilities that are the focus of interest in educational research. For example, educational psychologists describe a process through which children internalize information from the learning environment to develop a sense of self as an effective or ineffective learner (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Schunk, 1999). Educationally minded developmentalists have also shown that children's perceptions of control and beliefs about effort have direct effects on academic outcomes and are malleable; that programs that increase perceived control and beliefs about effort have effects on achievement (Fuchs et al., 2003; Mueller & Dweck, 1998; Skinner et al., 1998). This sense of self is then understood to contribute to the amount and type of effort that children expend and expectations for success that children hold. Effort and expectancy, which are aspects of the construct termed achievement motivation (Eccles & Wigfield, 2002), then feed back on both the learning environment and the child's sense of self, leading to a propitious or vicious cycle of effort, learning, and achievement across the school years (Schunk, 1999).

The organizational approach to the development of self-regulation outlined in this chapter provides an important complement to the theory of self-regulated learning in educational psychology. A central point of convergence concerns the active role of the individual in responding to the environment and shaping development (Bandura, 2001; Cicchetti & Tucker, 1994). The social-cognitive theory of self-regulated learning emphasizes a model in which the individual increasingly comes to play an active role in the process of internalizing information from the environment adaptively and systematically (Zimmerman, 2000). Similarly, the study of developing self-regulation within the neurobiological framework of effortful control and executive function presented in this chapter emphasizes the role of arousal processes in response to the environment, that when maintained at optimal levels engage higher order control processes important for problem solving.

In certain respects, research on effortful control and executive function from the perspectives of allostasis and cybernetics provides an additional source of evidence in support of the role of self-regulated learning in children's academic success. In short, the classroom environment is one that can be characterized as operating on cybernetic

principles through which teacher behaviors and the provision of information lead to processes in children that promote or retard optimal levels of arousal and increase or decrease the probability of executive cognitive processes important for learning and internalization of knowledge. Within such a perspective, the psychological phenomenon of motivation might be described at a neurobiological level as the appropriate self-regulatory directing and maintaining of arousal and attention associated with cortical and subcortical ventral stream processes that then leads to increased holding of information in mind, inhibition of prepotent responding, and shifting of attention associated with cortical dorsal and lateral stream processes. One of the benefits of characterizing motivation in terms of self-regulation is that it allows for some consideration of individual differences in the propensity for arousal and for the engagement of executive cognitive processes. This emphasis on individual differences also facilitates an understanding of motivation in relation to temperament, personality, and cognition.

### *Enhancing Self-Regulation to Promote Achievement*

Given the foregoing, an important and enduring question concerns the best ways in which to structure educational experiences for children so as to promote self-regulation, motivation, and achievement in diverse learners (Fuchs & Fuchs, 2005). An understanding of motivation and self-regulated learning provides one framework within which to design and evaluate efforts to promote achievement. Although efforts have been directed at all levels of educational experience, including secondary and postsecondary education (Bandura et al., 1996; Blackwell, Trsesniewski, & Dweck, 2007), the preschool period is of interest given (a) the rapid development of effortful control and executive function during this time (Diamond, 2002; Kochanska et al., 2000; Luciana & Nelson, 1998), and (b) the focus on school readiness as the confluence of emotional and cognitive development in young children (Blair, 2002).

A number of preschool programs have been shown to increase academic achievement, particularly for children from low-income homes and facing high levels of psychosocial disadvantage (Ramey & Campbell, 1991; Reynolds, Mavrogenes, Bezruczko, & Hagemann, 1996; Schweinhart et al, 2005). Furthermore, these programs have demonstrated effects on long-term life outcomes such as academic achievement, earnings, judicial involvement, home ownership, marital stability, and similar outcomes (Reynolds, Temple, Robertson & Mann, 2001; Schweinhart et al., 2005), suggesting that the programs promoted self-regulation and thereby increased what can be considered as the development of human capability (Heckman, 2007). Such a developmental understanding of a potential mechanism by which early intervention programs promote positive life outcomes is the focus of considerable interest given that economic cost–benefit analyses demonstrate a substantial return on investment in early childhood education (Heckman, 2006). Accordingly, interdisciplinary research combining psychology, economics, and neuroscience is underway to understand the iterative and organizational processes by which early compensatory programs might

work to promote what have been termed "noncognitive" factors; that is, aspects of personality, temperament, motivation, and emotion regulation (really anything other than traditionally measured mental ability) that assist the individual in attaining a positive and productive level of mental, physical, and social well-being (Borghans, Duckworth, Heckman & ter Weel, 2008).

At present the effects of early childhood programs on developing self-regulation and motivation are presumed, no doubt rightly so, due to their effects on life outcomes; but direct effects of these programs on self-regulation in early childhood were not measured. This is primarily because research on self-regulation was not particularly advanced in developmental psychology at the time at which initial effects of the programs were evaluated. More recently, however, an innovative preschool curriculum has been developed that specifically focuses on self-regulation and uses child-centered teaching practices similar to those contained in the programs for which long-term outcomes have been evaluated. This program, *Tools of the Mind* (Bodrova & Leong, 2007), incorporates Vygotskian principles to assist the child in acquiring "higher mental functions" through intersubjective, shared learning experiences with a supportive teacher (Bodrova & Leong, 2001). Within the Vygotskian framework, the higher mental functions are executive functions and are understood to enable the child to construct meaning, to develop a positive sense of self, and to effortfully and purposefully self-regulate behavior (Vygotsky, 1978). Furthermore, the emphasis in the approach is on the child's own contributions to development, on active and volitional processes of meaning making through the construction of experience. As with the emphasis on developing abilities and representations of the self as both being shaped by and shaping processes of development at multiple levels in the organizational perspective, the Vygotskian approach of *Tools of the Mind* emphasizes the active contribution of the individual to the developmental process.

Specific activities in the *Tools of the Mind* program are designed to instantiate the Vygotskian philosophy of learning and development. A good example comes from the emphasis on play. In the program, children spend sustained amounts of time in play through the teachers' introduction of themes, expansion of roles within that theme, imaginative use of props to forward the narrative of the theme, and the construction of what is referred to as a play plan (Bodrova & Leong, 2007). The play plan is something that children create under the guidance of the teacher prior to the play session and is one that requires children to coordinate motivations and interests with an orientation toward the immediate future, that of the play session in which they will soon engage. It is likely that this planning activity in relation to children's interests is an effective method for promoting executive function. Indeed, one general and widely accepted description of executive function, namely, the ability to integrate past knowledge with future goals (Fuster, 1997), aptly describes activities such as the play plan that are central to the *Tools of the Mind* curriculum. The play plan would appear to be one method of encouraging children to integrate wants and desires with planning and problem-solving cognitive abilities in the active shaping and control of their own experience. By considering their individual interests and developing a plan for

engaging in and forwarding their interests under the teacher's supervision, it is likely that children will begin to develop the facility to coordinate emotional and motivational aspects of their experience with cognitive control aspects of their experience; in short, self-regulation will occur.

Two evaluations of the *Tools of the Mind* program with a sample of children from low-income homes provide support for the idea that the activities that children experience in the program do benefit developing self-regulation and academic achievement. In a randomized comparison of the *Tools of the Mind* curriculum to a standard high-quality literacy-promoting preschool curriculum, the Vygotskian-based program was associated with increases in children's language development, reductions in teacher-reported behavior problems, measured pretest to posttest (Barnett, Yarosz, Thomas, & Hornbeck, 2006), and higher level of executive function ability at program end (Diamond, Barnett, Thomas, & Munro, 2007). Furthermore, the effect of the program on executive functioning was larger for more complex measures of executive function, and these more complex measures demonstrated larger correlations with academic ability in reading and math than did the less complex versions of the executive function tasks.

## Conclusion

In this chapter, we have attempted to outline a general neurobiologically based theory of the development of self-regulation in children and to describe the theory within the frameworks of the predominant research traditions on self-regulation development, effortful control and executive function. We have also related the theoretical approach to the study of self-regulation in academic achievement and considered its implications for early childhood education.

There are several aspects of the model of self-regulation outlined here that are consistent with current understanding of development in personality, cognition, and academic achievement. One concerns the idea that there is considerable plasticity in development in each of these aspects of the person, primarily as a result of the active role of the individual in shaping development. The active and regulating self, as an intentional agent (Bandura, 2001), is presumed to influence the psychological structure of personality (levels of conscientiousness, extraversion, etc.), cognition (memory, inhibitory control, attention abilities, etc.), and academic achievement (knowledge, effort, interest, etc.) in response to transactional or feedback processes with the environment. These cybernetic processes, along with stochastic or chance events, are understood to produce psychological development by influencing the extent to which stability or change occurs in a given domain of functioning (Fraley & Roberts, 2005). An important limit on change and plasticity, however, is imposed by the reciprocal relations among the self, the environment, and functioning within a given psychological domain. That is, given the principle of allostasis, developmental set points are reached between self and psychological functioning that are mutually reinforcing

and stable. Put another way, the process of development is one that may produce the appearance of constancy through a process of correlated constraint (Cairns & Cairns, 1994); that is, variation in factors important to a given domain of psychological functioning will be increasingly constrained by past experience, will shape future experiences through the choices one makes, and will thereby contribute to stability in the self and in psychological functioning.

Specific to academic achievement, we have focused on the ways in which individual differences in approach–withdrawal tendencies, along with individual variation in executive function abilities, may jointly influence the development of self-regulated learning in children. Development of self-regulation is understood to play a pivotal role in children's emerging sense of self as being "good" or "bad" at learning at school, which impacts performance and elicits feedback from teachers, parents, and peers that serves to instantiate trajectories toward high or low achievement (Zimmerman, 2000). Recognizing individual differences in characteristics of children that may be beneficial for or detrimental to self-regulated learning, however, we briefly described a preschool curriculum that is designed to promote self-regulation development in children. Further research on this program and programs like it is needed, to identify central activities that provide self-regulation enhancing interactions between children and teachers and between children in the classroom. Also needed is further study of the ways in which these types of self-regulation-promoting activities do or do not lead to increased school readiness and early academic success. Finally, further examination of the relation of self-regulation development to the types of instruction that children receive in the early elementary grades in specific subjects, and the ways in which this instruction can promote self-regulated learning and achievement, is also needed. In sum, by considering early school experience in terms of self-regulation development, it is likely that continued innovation in teaching and instruction can result that will help to ensure a meaningful level of educational achievement and positive life outcome for increasing numbers of children.

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# 5

# *Exploring Response Monitoring*

## Developmental Differences and Contributions to Self-Regulation

**Jennifer M. McDermott and Nathan A. Fox**

The term "self-regulation" broadly describes a multitude of processes involved in the implementation of control over one's own actions. This broad concept encapsulates the notion of regulation *of* the self *by* the self (Vohs & Baumeister, 2004). Our aim, in this review, is to provide conceptual and definitional clarity to the notion of self-regulation by focusing on the process of response monitoring, which is a major contributor to the ability to enact self-regulated behavior. We begin by describing response monitoring and reviewing the associated neural substrates that gives rise to the development of this process. The behavioral and physiological measures of monitoring are then discussed and the role of individual differences in the adaptiveness of response monitoring is explored.

### Introduction

The study of self-regulation covers a wide range of behaviors including compliance and delay of gratification as well as impulse, affect, and motor control (Kopp, 1982, 1991). Previous research has often portrayed these behavioral components as primary exemplars of, or proxies for, self-regulation. However, the field of neuroscience has forced definitional clarity and emphasized a need to identify the component processes that comprise sometimes vague and broad psychological constructs. Furthermore, models that unify the various components and contribute to a deeper understanding of a construct can be especially helpful in identifying its developmental origins and trajectories

of change (Keil, 1998; Kuhn & Pearsall, 2000). Within the broad framework of self-regulation, one such unifying component is response monitoring.

Response monitoring is an element of cognitive control that can occur in conjunction with other task-specific cognitive control skills. The process of response monitoring is directly related to the detection and evaluation of responses and behaviors and is further responsible for initiating appropriate strategy adjustments. As such, response monitoring is hypothesized to play a particularly important role as a mechanism that aids in the transition between task-specific cognitive control and the emergence of a broader ability to flexibly engage self-regulated behavior across multiple situations.

There are many behavioral measures that provide indirect assessments of response monitoring; however, these measures do not fully capture the detection, evaluation, and strategy adjustment segments involved in the complete response-monitoring process. Behavioral approaches also often fail to classify the neural systems involved in the activation of this regulatory mechanism. Therefore, fully documenting the processes involved in activating response monitoring requires investigations at both the physiological and behavioral levels. In addition, knowledge of the neural underpinnings of response monitoring could significantly contribute to the understanding of the plasticity within regulatory systems throughout development.

Current research on response monitoring in adults has made considerable strides in documenting this capability at both behavioral and physiological levels (Gehring, Himle, & Nisenson, 2000; Luu, Collins, & Tucker, 2000; Miltner, Braun, & Coles, 1997; Pailing, Segalowitz, Dywan, & Davies, 2002; van Veen & Carter, 2002). Although response monitoring in children is less clearly understood, advances in a variety of methodologies are providing new opportunities to examine the neural circuitry of children's monitoring patterns. In particular, a number of studies focusing on the physiological correlates of response monitoring in young children have recently emerged (i.e. Burgio-Murphy et al., 2007; Davies, Segalowitz, & Gavin, 2004; Santesso, Segalowitz, & Schmidt, 2005).

## The Response Monitoring Process

Response monitoring reflects tracking one's own actions and engaging in subsequent modification of future behavior. Developmentally, the activation and maturation of this process can be viewed as a critical driving force behind advancements in self-regulated behavior (Davis, Bruce, Snyder, & Nelson, 2003; Luu, Flaisch, & Tucker, 2000). According to Scheffers and colleagues (Scheffers, Coles, Bernstein, Gehring, & Donchin, 1996), the monitoring process involves at least two distinct facets, the detection of an error and the means to take corrective action in response to the error.

Although various terminologies have been used to describe the response-monitoring process (such as self-monitoring, error monitoring, or action monitoring), a number

of self-regulation theories commonly emphasize response monitoring as the key process through which flexible and efficient response adaptation to situational specific demands is accomplished. For example, according to Norman and Shallice's (1986) developmental model of self-regulation, the general "supervisory system" that controls responses to environmental contingencies also needs to have a monitoring process in place to ensure the proper functioning and performance of the larger control system. In this view, response monitoring has been conceptualized as a primary step in self-regulation, triggering a change from automatic to voluntary control of behavior (e.g., Bandura, 1986; Kanfer & Hagerman, 1981; Kanfer & Karoly, 1972; Karoly, 1993).

Kopp (1982, 1991) also proposed a model of self-regulation in which children develop the means to form clear representations of external expectations (i.e., caregiver expectations) and to act in accordance with these expectations. In this model, Kopp emphasizes the achievement of self-controlled behavior, or the ability to inhibit behavior, as a hallmark of self-regulation. Moreover, the mechanism through which a child achieves self-control is described as a response-monitoring process which Kopp terms the "self-monitoring system." This system entails internalized recall of external expectations and balances these with one's own personal expectations and goals. Integration of these components would allow the child to apply behavioral self-control, or inhibitory control, in appropriate contexts and thereby accomplish self-regulation.

Across various models of self-regulation, it is generally agreed that the process of response monitoring as a whole serves several functions. First, monitoring of accurate or appropriate responding provides factual information regarding the task at hand. Second, monitoring of performance in relation to outcome goals can influence motivation levels. Third, monitoring also triggers self-reflection (Bandura, 1986; Karoly, 1993). In sum, these functions allow for the detection of errors, the initiation of remedial action (Scheffers & Coles, 2000) and the implementation of regulated behavior.

The contribution of response monitoring to self-regulation is most evident in studies that have examined targeted populations in which a deficit in response monitoring is presumed. For example, disorders associated with poor self-regulation in the form of externalizing behaviors (i.e., aggression; attention hyperactivity disorder, ADHD; oppositional-defiant disorder, ODD) appear to have problematic activation, and/or maintenance of, response monitoring, whereas disorders associated with internalizing behaviors (i.e., obsessive-compulsive disorder, OCD) seem more vulnerable to the overactivation of the response-monitoring mechanism (Gehring et al., 2000).

Understanding the normative development of self-regulation is a critical step in understanding the etiology of various psychological outcomes typically associated with deficits in self-regulation (Calkins & Fox, 2002; Posner & Rothbart, 2000). In particular, the manner and degree to which monitoring functions are utilized on a consistent basis may contribute to variability in self-regulation patterns. For example, early self-regulatory behaviors have been found to predict a variety of adaptive outcomes (McCabe, Cunnington, & Brooks-Gunn, 2004) including social competence (Denham et al., 2003), emotional knowledge (Schultz, Izard, Ackerman, & Youngstrom, 2001),

resiliency (Eisenberg et al., 1997), and cognitive achievement in later childhood (Shoda, Mischel, & Peake, 1990).

Interestingly, the resilience literature indicates that resilient youths are more likely to display enhanced self-regulation as compared to nonresilient youths, particularly if the child has experienced active monitoring by an adult authority figure (Buckner, Mezzacappa, & Beardslee, 2003). Findings such as this fit well with developmental theories of self-regulation in which response monitoring undergoes a shift from being initiated by external sources to being generated internally within the child. As this transition occurs, children are better able to self-engage in response monitoring and thus display regulated behaviors across a variety of optimal and suboptimal contexts.

## Neural Substrates of Response Monitoring

In general, the maturation of the prefrontal cortex (PFC) is thought to be a key contributor to the emergence of regulatory abilities (Benes, 2001; Bjorklund & Harnishfeger, 1995; Casey, Giedd, & Thomas, 2000; Diamond, Kirkham, & Amso, 2002) with maturation continuing from birth through adolescence (Fuster, 2002; Giedd, 2004). This protracted period of development allows for more efficient interregional neural processing (Casey et al., 2000). Activation of the PFC has long been noted as a major contributor to a child's increased ability to adapt to regulatory demands (Bjorklund & Harnishfeger, 1995; Casey, Giedd, & Thomas, 2000; Diamond, Kirkham, & Amso, 2002). Implicated in a variety of cognitive functions, the PFC has major growth spurts occurring at birth, between 4 to 7 years of age, and again during adolescence. The timing of these major shifts in neural development is associated with dramatic increases in self-regulatory abilities across childhood (Benes, 2001; Casey et al., 2000), particularly across the early school years. This period of rapid skill advancement coincides with the second period of active neural maturation, when the cells of the PFC increase in size and complexity, form additional synapses, and undergo myelination (Fuster, 2002; Thatcher, 1992).

Distinct regions within the PFC have also been linked to specific aspects of regulatory control. For example, the anterior cingulate cortex (ACC), lying in the medial area of the PFC, registers concordance between current goals and actions (Bush, Luu, & Posner, 2000). Other ACC-related functions include facilitation of action monitoring, goal-directed behavior, conflict detection, mediation of response selection, and modulation of attention (Bush et al., 2000; Davies et al., 2004; Rothbart, Sheese, & Posner, 2007; van Veen & Carter, 2002).

According to Posner and Rothbart (2000), the ACC is a primary structure of the executive attention network involved in modulating a number of other networks to direct cognitive and emotional processes (Rothbart, Sheese, & Posner, 2007). As part of this network, the ACC functions to engage voluntary control of attention to implement basic cognitive, as well as emotional, regulation and control strategies. Support

for the role of the ACC in modulating these types of processes is found in imaging studies that draw attention to the diverse connectivity of the ACC. For example, activation of the connections between the ACC and auditory or visual regions differ according to task-specific requirements (Crottaz-Herbette & Menon, 2006; Etkin, Egner, Peraza, Kandel, & Hirsh, 2006). The ACC has also been functionally divided into dorsal and rostral-ventral subdivisions. Neuroimaging work further demonstrates that these divisions are linked to cognitive and affective functions respectively (Drevets & Raichle, 1998).

The more dorsally located subdivision of the ACC is associated with basic cognitive processing and has a number of reciprocal connections with the lateral PFC, the parietal cortex, and motor areas. Imaging studies show heightened activation of these areas in tasks which tap skills that are influential in the overall effectiveness of self-regulation efforts, such as interference suppression and conflict resolution (e.g., Bush et al., 1999; Carter, Botvinick, & Cohen, 1999; Drevets & Raichle, 1998). These types of skills are especially important to regulatory efforts because the ability to suppress a response to interfering stimuli contributes to enhanced focus on goal-relevant stimuli, whereas the ability to successfully resolve a strong conflict between one's personal desires and a set of rules contributes to the enactment of situation-appropriate behavior.

In contrast to the primarily cognitive processing dorsal region, the rostral-ventral subdivision of the ACC appears to be more strongly linked to affective processing. As such, this area is coupled with limbic structures including the amygdala, nucleus accumbens, hypothalamus, and the hippocampus as well as the orbital frontal region (see Bush et al., 2000 for a review). Activation of the rostral-ventral portion of the ACC is directly implicated in affectively laden tasks that involve processing of distress, motivation, and emotional stimuli (Davis, Bruce, & Gunnar, 2002; Etkin et al., 2006; Lane, Reiman, & Axelrod, 1998; Posner & Dehaene, 1994; Posner & Rothbart, 2000) as well as in tasks that require participants to actively control their experience of positive or negative affect (Beauregard, Levesque, & Bourgouin, 2001; Ochsner, Bunge, Gross, & Gabrieli, 2002).

Despite interest in the ACC and its various cognitive and affective processing functions, research investigating the neural development of this region in children is sparse. Many of the neuroimaging techniques used in adult studies are difficult to implement with children. As such, developmental studies tend to rely on behavioral representation of skills associated with ACC activation. However, increasing use of psychophysiological methodology (i.e., event-related potentials, ERPs) with children and infants may shed light on the functional development of the ACC across tasks of varying cognitive complexity and among children with different affective biases.

## Behavioral Measures of Response Monitoring

A primary behavioral measure of response monitoring is the overt action of self-correcting erroneous responses. Rabbitt (1966) found that adult participants rapidly

correct themselves after pressing the wrong button in a forced-choice selection task by immediately pressing the correct button. Response monitoring in this context can be measured for presence or absence of self-correction after an error and also for response time latency to implement self-correction. This type of monitoring occurs rapidly and can be observed prior to the presentation of external performance feedback.

Another way of measuring response monitoring in cognitive tasks (e.g., Stroop, flanker, or go–no go paradigms) is to examine response times on trials following an error as compared to response times following correct trials. If inaccurate performance is particularly salient to an individual, more controlled and slower responding in the trial following an error is typically exhibited (Davies et al., 2004; Henderson, 2003; Luu, Collins et al., 2000). This form of response monitoring can be viewed as a subjective compensatory strategy where participants slow their reaction time after an error in order to maximize accurate performance on the upcoming trial. Several developmental studies that have assessed strategy adjustment indicate that children do generally have the ability to exhibit this aspect of the response-monitoring process; however, not all children display this reaction time slowing pattern (Davies et al., 2004; Henderson, 2003; Jones, Rothbart, & Posner, 2003; Stins, Polderman, Boomsma, & de Geus, 2005). It is postulated that the discrepancy in strategy adjustment among children may reflect a prominent role of individual differences in error reactivity and performance value on this component of the response-monitoring process (McDermott, Pérez-Edgar, & Fox, 2007).

Additional measures of response monitoring have also been examined in infants and preschoolers. For instance, it has long been shown that infants have the ability to monitor their stress levels and exhibit self-regulation via orienting of attention to interesting objects in order to soothe themselves (see Harman, Rothbart, & Posner, 1997 or Posner & Rothbart, 1998). Likewise, in the process of learning from motor actions, infants display a form of response monitoring when they make repeated attempts at obtaining objects by varying their approaches aimed at controlling and implementing appropriate arm movement (Konczak, Borutta, & Dichgans, 2004).

Interestingly, this early response-monitoring ability, which involves basic evaluation and adjustment of one's body in relation to objects, precedes an infant's ability to coordinate multiple levels of sensory information in order to monitor progress towards object retrieval (von Hofsten, Vishton, Spelke, Feng, & Rosander, 1998). For example, Diamond (1991) demonstrated that at 9 months of age infants reaching to retrieve an object from a box are completely dominated by visual information. These infants focus only on line-of-sight information and continue to reach for an object they can see through a closed side of a clear box, even if they accidentally happen to touch the object through a more obscure but open side. However, by 12 months of age infants have adapted strategies that let them view an object from one direction and reach to retrieve it from another direction. This discrepancy in monitoring across ages suggests that an underlying neural system for response monitoring may exist quite early in infancy, but continues to develop throughout childhood. Specifically, this development is postulated to occur in accordance with the growth of corresponding brain regions

(i.e., the PFC and ACC), which can lead to more elaborate forms of monitoring and more successful regulatory ability in children.

In preschool-aged children behavioral regulation is commonly examined in the context of inhibitory control tasks which require children to either withhold responses or produce incompatible responses. Examples of such tasks include simplified go–no go paradigms like the Simon Says game (Jones et al., 2003) or Luria's (1961) tapping task in which children are asked to generate a tapping sequence that contrasts the sequence performed by the experimenter (Diamond & Taylor, 1996). These types of tasks that focus on conflict situations often provide the optimal conditions for assessing response monitoring skills. Rather than preceding response monitoring as predicted, Jones et al. (2003) found evidence that children's inhibitory control develops in parallel with monitoring skills. Specifically, a positive association emerged between increased performance accuracy and the development of posterror slowing in a Simon Says task in the 4-year-old, but not 3-year-old, age group.

This developmental progression of increasing response monitoring has also been found in verbal forms of monitoring in which children outwardly indicate recognition of an error. For instance, in a study using the dimensional change card sort (DCCS) task, 3-year-old children rarely self-reported errors (Jacques, Zelazo, Kirkham, & Semcesen, 1999). This verbal form of error detection is often referred to as private speech which is characterized as consisting of a variety of verbal communication ranging in form from mere utterances to specific task-oriented directive speech (Berk, 1986; Winsler, Diaz, Atencio, McCarthy, & Chabay, 2000). Commonly exhibited in young children, private speech is considered to be language that is spoken solely for the benefit of oneself and helps in directing and regulating behavior. More specifically, private speech is hypothesized to facilitate the developmental transition from outward regulation to internal response monitoring across early childhood (Vygotsky, 1934/1987; Winsler & Naglieri, 2003).

Interestingly, the development of verbal response-monitoring strategies does not appear to map onto the emergence of other forms of error detection and monitoring. For example, in the Simon Says task children were found to use physical rather than verbal response-monitoring strategies in order to detect errors (i.e., immediately correcting an inaccurate motor response) and to enhance performance (i.e., physically restraining an arm when arm motion was required to be withheld). These patterns extend the work in infants and toddlers that has used tower building tasks and other paradigms involving physical manipulation of objects to demonstrate early patterns of response monitoring (e.g., DeLoache, Sugarman, & Brown, 1985; Konczak et al., 2004). Combined, these patterns of response monitoring indicate that assessment of response monitoring in children may be task-specific, with varying paradigms eliciting different forms of monitoring strategies, particularly in young children.

In accordance with this view, it has been hypothesized that monitoring strategies may directly be influenced by the form(s) of feedback that are directly provided to the child through the task itself (DeLoache et al., 1985). For instance, in paradigms using nesting cups, the action of manipulating the cups combined with the composition of

the cups themselves inherently provides functional feedback that children can easily sense (i.e., the lack of fit when children incorrectly attempt to place a bigger cup inside a smaller cup). The feel of resistance between nonfitting cups provides feedback that the current action is an error and young children can utilize this knowledge to institute corrective action.

Applying a nesting cup paradigm, DeLoache et al. (1985) found that all participants between the ages of 18–42 months of age were equally sensitive to stacking errors; however, developmental differences emerged in the flexibility and extensiveness of the correction strategies that children used to achieve their stacking goals, with older children performing better than younger children. However, other tasks, in which materials may provide more ambiguous feedback, have revealed developmental change for both error detection and correction strategies (Deloache et al., 1985; Wilkinson, 1982). Besides feedback based on material dimension (i.e., cups that don't fit), it is also possible that the task materials themselves can influence outcome goals. For instance, if the task involves stacking rings and the child's goal is not to stack them in size order but rather to simply put them on the pole then the child will be less likely to detect the stacking error related to size (DeLoache et al., 1985). Thus behavioral measures provide some evidence of early appearing forms of response monitoring; however, further work is needed to clearly document the emergence of more complex response monitoring efforts.

## Physiological Measures of Response Monitoring

In addition to assessing the emergence of response monitoring with behavioral tasks, researchers have also identified methods for examining the neural signature of response monitoring using event-related potential (ERP) methods. This innovative approach involves time-locking the ERP to the subject's response rather than to the presentation of the stimulus. Doing so, one can assess trials in which a subject makes an error versus those in which the subject makes a correct response. One such ERP is called the error-related negativity (ERN). Time-locked to the execution of a response (i.e., button press), the ERN has a centro-medial scalp distribution and imaging as well as source localization studies indicate that the ERN is generated within the ACC (Herrmann, Rommler, Ehlis, Heidrich & Fallgatter, 2004; Holroyd, Nieuwenhuis, & Yeung, 2003; van Veen & Carter, 2002).

Due to the nature and localization of this component it has been proposed that the ERN is part of a larger error-monitoring system that is influential in the implementation of self-regulatory skills. More specifically, the ERN is thought to represent a feed-forward control mechanism that monitors internal goals by first comparing anticipated outcomes with actual behaviors and then informing other regulatory systems (i.e., PFC) of the need to make adjustments in cognitive strategies or behavioral performance (Bernstein, Scheffers, & Coles, 1995; Rodriguez-Fornells, Kurzbuch, & Munte, 2002). Evidence for this feed-forward system is found in several adult studies which

indicate a direct link between the ERN and behavioral error compensation such that individuals who had higher amplitude ERNs also have longer behavioral response latencies on correct trials following error trials (Gehring, Goss, Coles, Meyer, & Donchin, 1993; Scheffers et al., 1996).

There are a number of theories which postulate the neural systems involved in response monitoring and the generation of the ERN; however, one of the most comprehensive frameworks is the reinforcement learning model (RL-ERN; Holroyd & Coles, 2002; Holroyd, Yeung, Coles, & Cohen, 2005). This theory is based on a computational modeling approach which integrates the electrophysiological study of response monitoring with the broad field of reinforcement learning. In particular, this model incorporates the notion of a feed-forward mechanism and specifically conceptualizes the ERN as part of a continuous process of ongoing monitoring (Willoughby, 2005) that represents reactivity to performance outcomes.

Within the RL-ERN model, the ACC functions to filter sensory input and propagate the error signal that originates in the basal ganglia. Described as the "adaptive critic," the basal ganglia processes incoming sensory information, predicts event-related outcomes, and compares anticipated performance to actual outcomes. A mismatch between performance expectations and outcomes results in the generation of an error signal from the basal ganglia and the production of the ERN via the ACC (see Holroyd & Coles, 2002; Holroyd, Nieuwenhuis, Mars, & Coles, 2004; Holroyd et al., 2005, for further descriptions of the neural networks involved in the RL-ERN theory). This information is also transmitted to control areas (e.g., dorso-lateral PFC) to signal the need for performance or strategy adjustment.

In addition to the cognitive representation of error reactivity, the ERN may also reflect affective consequences of unexpected outcomes. Specifically, mistakes or conflict are thought to produce emotional appraisal of expectancy violations (Luu & Pederson, 2004). In accordance with this notion, research has revealed links between the magnitude of the ERN and the affective distress generated by emotional evaluations (Luu, Collins et al., 2000). Proponents of this emotional processing theory of the ERN refer to the connection between the ERN and ongoing theta rhythms (4–7 Hz band) as neural evidence that the ERN may reflect more than one component of ACC function. In this manner, it has been proposed that the ERN may actually reflect theta activity involved in the coordination of learning and action-regulation processes which involve the limbic system (Luu & Pederson, 2004).

Further support for the emotional processing theory of the ERN is evident in studies of motivational manipulation and affective predispositions. This work demonstrates that perturbations in the affective system can create corresponding variation in ERN amplitude. For example, individuals high on the trait of conscientiousness display less variation in ERN amplitude across motivational manipulations of high and low reward (Pailing & Segalowitz, 2004). However, individuals high in impulsivity exhibit greater variability in ERN amplitudes across punishment versus reward conditions (Potts, George, Martin, & Barratt, 2006). Furthermore, individuals high on negative affect and/or negative emotionality display ERNs with larger amplitudes as

compared to individuals low on negative affect and emotionality (Hajcak, McDonald, & Simons, 2004; Luu, Collins et al., 2000). On the other hand, ERN amplitudes have been found to vary as a function of task duration in individuals with differing levels of negative emotionality. Specifically, ERN amplitudes diminished for individuals high in negative emotion over the course of the task; however, the opposite pattern was observed for individuals low in negative emotion (Luu, Collins et al., 2000). This result suggests that negative emotionality significantly impacts the magnitude and duration of response monitoring as assessed via the ERN.

Subtle differences have also emerged in the ERN literature when assessing individuals high in general anxiety and worry. For instance, undergraduates who report high levels of obsessive-compulsive symptoms or general anxiety exhibit enhanced ERN amplitudes in response to errors but they also differ in their reactivity to correct trials as compared to controls (Hajcak, McDonald, & Simons, 2003; Hajcak & Simons, 2002). In contrast, individuals diagnosed with clinical levels of anxiety consistently demonstrate greater reactivity only to error trials. For example, individuals with OCD exhibit significantly larger ERN amplitudes than matched controls (Gehring et al., 2000).

The amplitude of the ERN in individuals with OCD also corresponds to symptom severity such that more intense symptoms are related to greater ERN amplitude. In addition, adolescents diagnosed with an anxiety disorder demonstrate enhanced ERNs compared to age-matched controls (Ladouceur, Dahl, Birmaher, Axelson, & Ryan, 2006). Although results from both diagnosed and nondiagnosed samples suggest a hyperactivation of the neural system associated with response monitoring (see Gehring et al., 2000), clinical populations are more consistently identified by reactivity that is specific to error trials as compared to nondiagnosed populations which can exhibit heightened reactivity to both correct and incorrect responses.

Further emphasizing the complexity of assessing individual differences in response monitoring, interactions between personality and task design have also been found to influence the ERN response. For instance, Dikman and Allen (2000) found that participants rated as low in socialization display smaller ERNs in conditions of punishment as compared to conditions in which they are rewarded for good performance. In another study, the emotional nature of the stimuli (i.e., happy or angry faces) interacted with participant's self-reported level of task anxiety. Specifically, high state anxiety individuals exhibited enhanced ERNs in response to errors on happy face stimuli and smaller ERNs in response to errors on angry face stimuli (Compton et al., 2007). The authors of this study suggest that reactivity to the commission of errors varies not only as a function of underlying personality but also as a product of individual differences in performance expectations.

More recently, the ERN has been conceptualized as representing the activation of defensive motivation responses. In particular, Hajcak and Foti (2008) demonstrate that individuals with large ERNs display significantly larger potentiated startle responses on the trials following an error, which suggests that error reactivity may prime defensive motivation. The notion that aversiveness to errors is indexed by the ERN has some support in the previously reviewed literature which highlights heightened error

reactivity among certain groups of anxious individuals. Additional work examining individuals who vary in personality traits associated with approach or withdrawal (behavioral activation or inhibition; Gray, 1982) suggests that behaviorally inhibited individuals are sensitive to the commission of errors due to an underlying motivation to avoid punishment (Boksem, Tops, Wester, Meijman, & Lorist, 2006).

Overall, debate still exists on the functional range of the ERN and its relation to specific cognitive processes as well as the influence of individual differences in personality on patterns of ERN amplitude and latency. Within the developmental literature, the expression of the ERN is just beginning to be examined. Recent progress has been made in identifying developmental patterns of ERN emergence across middle to late childhood. In a cross-sectional study of ERN development, Davies et al. (2004) found that the expression of the ERN was more stable and prominent with age in participants ranging from 7 to 25 years old. Furthermore, research focusing on the adolescent age range (Ladouceur, Dahl, & Carter, 2007; Santesso & Segalowitz, 2008) also demonstrates a development increase in ERN amplitude from early to late adolescence as well as into young adulthood. Combined, these results may be indicative of maturational patterns of the ACC region which underlie ERN expression or developmental differences in the recruitment of the ACC in response-monitoring (Ladouceur et al., 2007; Santesso & Segalowitz, 2008).

Similar to patterns in the adult literature, individual differences also influence children's response monitoring as assessed via the ERN. For example, children who have high rates of obsessive-compulsive behaviors exhibit greater ERN responses compared to children with low rates of these behaviors (Santesso, Segalowitz, & Schmidt, 2006). Among other populations of children, such as those with attention-deficit hyperactivity disorder (AD/HD), the ERN response depends upon diagnosis and treatment status (Burgio-Murphy, 2007; Groen et al., 2008; Jonkman, van Melis, Kemner, & Markus, 1999; Wiersema, van der Meere, & Roeyers, 2005). These varied monitoring patterns imply that for children with specific attentional characteristics, ERN variation may be closely connected to response monitoring efforts.

Overall, the combination of ERN and behavioral posterror slowing findings indicate that children can react to error commission in a similar manner as adults. However, there are clear developmental differences in the magnitude and efficiency with which children are able to engage in response monitoring. As such, further work is called for to elucidate the manner in which children develop adult-levels of monitoring and a particular emphasis is needed on understanding variations in neural mechanisms underlying response monitoring.

## Temperamental Influences on Response Monitoring

In order to better understand the development of behavioral and physiological measures of response monitoring, it is helpful to consider the potential influence of

individual differences in children's temperament. Although temperament is related to personality, the two constructs are distinct (Martel & Nigg, 2006; Rothbart & Bates, 2006; Shiner & Caspi, 2003). For the young child temperament may closely correspond to the whole of their personality but for adults personality consists of additional elements (e.g., attitudes and values) beyond reactivity and regulation tendencies (Martel & Nigg, 2006). More specifically, temperament consists of both reactivity and regulation components, with the former appearing early on and the later emerging as the child develops (Rothbart, Ahadi, Hershey, & Fisher, 2001; Rothbart & Bates, 2006; Rothbart & Derryberry, 1981).

The reactivity components of emotion, activity, and attention are biologically based and are regulated over time by the emergence of temperamental control mechanisms (i.e., selective orienting and effortful control of attention; Rothbart, Ellis, Rueda, & Posner, 2003). Within this framework, the development of effortful control is the major cornerstone to the development of self-regulation. Effortful control is a dimension of temperament that includes the ability to plan, initiate subdominant responses, identify errors, and adapt behavior (Rueda, Posner, & Rothbart, 2004). It can be assessed as early as toddlerhood although specific skills associated with effortful control continue to develop well past 3 years of age. Effortful control has been linked to the emergence of conscience, empathy, and compliance (Kochanska, Coy, & Murray, 2001; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996), as well as social competence and general adjustment (Cumberland-Li, Eisenberg, & Reiser, 2004; Eisenberg, Smith, Sadovsky, & Spinrad, 2004).

Underlying the development of effortful control are the neural substrates of the executive attention system (see Rothbart et al., 2007 for a review). This system is involved in the monitoring and resolution of conflict among neural networks (Botvinick, Braver, Barch, Carter, & Cohen, 2001), a function that Rothbart and colleagues suggest is key to the development of self-control (Rothbart et al., 2007). This type of conflict resolution centers on the task of inhibiting a dominant response in order to activate a subdominant response, whereas response monitoring focuses on processing the outcomes of response choice and resolving discrepancies between expected and actual performance. Although debate exists regarding the degree to which conflict resolution and response monitoring overlap in form and function, these processes are both linked to activation of the ACC.

The impact of temperamental traits on the response-monitoring aspect of ACC functioning has been examined in several studies that have assessed variation of children's monitoring via ERN expression. For instance, Santesso and colleagues (Santesso, Segalowitz, & Schmidt, 2005) used the Junior Eysenck Personality Questionnaire with 10-year-olds and found patterns similar to the relation between personality and ERN expression in adults. Specifically, children low in socialization exhibited attenuated ERNs. Henderson (2003) has also demonstrated connections between temperament assessments of inhibitory control and ERN expression such that children scoring lower in inhibitory control exhibit larger ERNs. Combined, these results suggest that individual differences in affective style (i.e., temperament) may contribute to variation in the

development and refinement of the dynamic cortical circuitry that contributes to the expression of error detection processes (i.e., ERN) that are involved in response monitoring. Nonetheless, additional research is needed to better characterize the influence of various temperamental traits on both physiological and behavioral measures of response monitoring.

Examining the more direct link between temperament and regulatory control, a number of studies have found individual differences in performance on cognitive tasks by children of various temperaments. Gonzalez and colleagues (Gonzalez, Fuentes, Carranza, & Estevez, 2001) found that temperament measures of emotionality and regulation were predictive of Stroop and flanker interference effects such that children scoring higher in negative affect experienced greater difficulty with flanker interference effects, whereas children rated as low in inhibitory control exhibited greater difficulty with the Stroop interference effect. As a regulatory dimension of temperament, inhibitory control plays a key role in both cognitive and emotional development (Kochanska et al., 1996). A major shift in inhibitory control occurs during the preschool time period, when children improve in delay of gratification and conflict tasks which require high levels of inhibitory control (Carlson & Moses, 2001; Gerstadt, Hong, & Diamond, 1994; Kochanska et al., 1996). As children progress through early to middle childhood, they demonstrate a marked capability to perform higher levels of inhibitory control, thus making inhibition an important contributor to the emergence of successful self-regulation.

However, the precise connections between inhibitory control and response monitoring are not well studied. In a study of preschoolers, Jones et al. (2003) found that inhibitory control and response monitoring emerged in a similar developmental time course. Although these results suggest that response monitoring may signify the need to engage inhibitory control, the reverse relation is not as clear. Further study is also needed in order to delineate the stability of associations between response monitoring and inhibitory control across a wider developmental age range.

## Individual Differences in the Adaptiveness of Response Monitoring

In typically developing children, the presence of certain temperamental traits contributes to adaptive socioemotional functioning. Fearful temperament has been shown to affect the development of empathy, conscience, and low levels of aggression (Kochanska, Aksan, & Joy, 2007; Rothbart, 2007). Similarly, effortful control also contributes to the development of empathy, conscience, and low aggression (Kochanska, Murray, & Harlan, 2000). In moderate amounts, both fear and effortful control promote positive behavioral outcomes. Fear draws attention to specific components of interpersonal interaction, whereas effortful control allows for suitable levels of reaction by using situational and emotional cues to guide appropriate actions. Furthermore, diminished

functioning of either fear or effortful control is related to maladaptive behavioral outcomes (i.e., externalizing problems; Rothbart, 2007).

The unique balance that effortful control achieves between attending to potentially upsetting stimuli and initiating adaptive responding serves well to modulate behavior for children high in negative affect (Rothbart & Posner, 2006). However, children who are temperamentally fearful and who do not develop the ability to flexibly shift attentional focus may be at an increased risk for internalizing problems. Among these children it is not engagement, but rather disengagement, of attention that seems to be impaired. In this manner, behaviorally inhibited or temperamentally fearful children who remain focused on threat may exhibit higher rates of social reticence (Fox, Henderson, Marshall, Nichols, & Ghera, 2005) as evidenced by watching rather than participating in peer interactions (Coplan, Rubin, Fox, Calkins, & Stewart, 1994). For the fearful child, fixation on anxiety-inducing social situations fails to decrease wariness and may increase the likelihood of continued behavioral inhibition and anxiety if the child cannot manage to regulate his or her emotional reactivity (Fox et al., 2005; Derryberry & Rothbart, 1988).

Even when behaviorally inhibited children are able to overcome their initial wariness to social situations and attempt to interact with other children, they may still be impeded by heightened response monitoring without corresponding corrective actions. For instance, Henderson and colleagues (Henderson, Martin, & Fox, 2004), assessed children's reactivity to social bids during a series of freeplay scenarios and found that among children who were high in both behavioral inhibition and inhibitory control a negative correlation emerged between the rate of children's failed attempts to engage another child in play during the first freeplay session and the number of peer interaction attempts made 30 minutes later in a second freeplay session Thus, in the course of monitoring their social interactions, this group of behaviorally inhibited children were unable to utilize feedback from their peers to adjust their play strategy in the second play session. Instead, they retreated further from peer interaction. To summarize, monitoring actions without corresponding behavioral adjustments resulted in poor social interaction for children high in behavioral inhibition and inhibitory control.

In our work studying social competence of children identified with behavioral inhibition we have examined the role of response monitoring as a moderator of child temperament. We have found that high response monitoring has been linked to differential outcomes for inhibited versus noninhibited adolescents. For adolescents high in behavioral inhibition, enhanced response monitoring was associated with greater odds of experiencing anxiety problems. However, among noninhibited adolescents, the opposite pattern emerged such that low response monitoring was linked to greater anxiety issues for this group (McDermott, Pérez-Edgar, Henderson, Pine, & Fox, 2008). We view the enhanced response monitoring among behaviorally inhibited adolescents as reflecting a lack of flexibility rather than an aberration in their monitoring abilities. By the same token, adolescents low on behavioral inhibition and low in monitoring may also display behavior problems. Again, the issue is not their response monitoring per se but rather their flexibility in use of this skill.

This premise follows the two-trait model of personality proposed by Block and Block (1980) in which extremely high or extremely low levels of ego control result in rigid and dysfunctional patterns of behavior. Specifically, low control is associated with spontaneity and impulsivity, whereas high control is thought to manifest as obsessiveness and anxiety. Similar to this notion, response monitoring may also function along a continuum in which extremely low or extremely high levels result in maladaptive behavior patterns.

It may also be the case that variations in response monitoring across tasks and populations reflect different aspects of the monitoring process rather than higher or lower levels of the same capacity. Work by Nolan-Hoeksema (1991, 2000) suggests that the combination of negative affect and rumination, which may reflect continual engagement of monitoring past performance, is associated with duration and severity of symptoms in depressed individuals. This type of rumination consumes cognitive resources, making it difficult to reallocate attention towards novel problem-solving strategies (Lyubomirsky & Nolen-Hoeksema, 1995; Pyszczynski, Greenberg, Hamilton, & Nix, 1991) and further indicates problems either with disengagement of the monitoring process itself or the activation of additional reflective process beyond initial response monitoring.

In fact, recent imaging work demonstrates that ruminative processes modify engagement of specific neural mechanisms, such as the amygdala, which amplify the experience of negative affect (Ray et al., 2005). This finding provides support for the notion that monitoring can trigger additional processes which contribute to poor regulation outcomes such as depression or anxiety. Overall, the threshold for adaptive self-regulation as guided by response monitoring and associated processes appears to be strongly influenced by individual differences in development and personality. Further research on monitoring across these domains may help to clarify the various pathways through which emotion–cognition interactions serve to guide and regulate the adaptiveness of behavior.

## Future Directions

Like many cognitive processes, response monitoring is intertwined with affective processing. There are two perspectives from which to examine affective impact on monitoring. One perspective examines variability in response monitoring within the framework of emotionally laden scenarios, whereas the second focuses on the role of affective biases in promotion or attenuation of response monitoring. Although a great deal of research has examined monitoring from both perspectives in adult populations using behavioral and physiological assessments, similar research in children is just recently coming into focus and deserves further consideration.

In summary, establishing more powerful models of the connections between cognitive and affective processes of self-regulation will be greatly helped by identifying

specific regulatory mechanisms that can be examined at both physiological and behavioral levels. Response monitoring is one such neural process that can be investigated in this manner. Future research should focus on current gaps in the literature regarding the precise functional significance of the components representative of response monitoring in populations of different ages and personality characteristics.

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# Part II

*Personality Processes*

# 6

# *Self-Regulation Processes and Their Signatures*

## Dynamics of the Self-System

**Carolyn C. Morf and Stephan Horvath***

The relationship between personality and self-regulation is usually portrayed as one in which either individual differences moderate general processes of self-regulation, or personality leads to stable tendencies to self-regulate in particular and consistent ways (e.g., Hoyle, 2006). In these analyses, self-regulation refers broadly to the psychological processes through which people control their thoughts, emotions, and behaviors (e.g., Baumeister, 1998; Carver & Scheier, 1981). Alternatively, in this chapter we outline our viewpoint of personality and self-regulation as fully integrated processes, in which individual differences are expressions of distinctive dynamic processing systems of self-regulation. It begins with the premise that individuals routinely perceive and interpret situations, and self-regulate in relation to them in characteristic ways. This self-regulatory process is in the service of their goals for a desired self, influenced by the obstacles and opportunities that are either self-generated or encountered in the life course. Individual differences from this perspective then are seen as reflecting the processes of self-regulation of one's most important and valued self-goals. They reflect an evolving meaning system of self-construction and regulation toward distinctive identity goals.

To the degree that individuals share similar self-goals, consistent sensitivities to particular social parameters, and characteristic reactivities to these contingencies, they can be considered as personality types. In other words, personality types

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emerge from shared meaning systems of self-construction. This is not to say that personality consists *only* of self-regulatory processes. The self-system and its consistent regulation, however, is a core component of personality, as the chronic accessibility of self-schemas continually affects the interpretation of (social) information. The regulation of the self-system guides the individual's perceptions and construals of events, highlighting differential situational affordances or constraints for the pursuit of particular self-goals. Depending on their self-system, individuals then differ in the responsiveness to the particular affordances they perceive, and in their characteristic self-regulatory response tendencies. Personality or individual differences thus are reflected in stable patterns of distinctive self-regulatory processing dynamics.

In this chapter, we begin by explicating our dynamic self-regulatory processing framework of personality and highlight the role of "*if . . . then . . .*" self-signatures. Self-signatures are the chronic and characteristic "*if . . . then . . .*" patterns of cognitive, emotional, and behavioral variation that are played out in efforts to construct and regulate the self (Mischel & Morf, 2003). When such signatures are shared by a group of individuals, they can be used to understand the expressions and underlying mechanisms of a distinctive personality type (Morf, 2006).

To illustrate, individuals high on narcissism, for example, look forward to self-presenting in positive ways when surrounded by important people and self-promotion appears possible (Morf, Davidov, & Ansara, 2008); yet they become aggressive and insolent towards others when their self-promotional efforts are blocked or stymied (Bushman & Baumeister, 1998; Morf & Rhodewalt, 1993). Such observed signatures allow one to infer that a desire to demonstrate superiority, co-occurring perhaps with a latent fear of worthlessness, is a common self-goal of this personality type. This shared goal induces particular chronic accessibility and sensitivities for particular situational contingencies that are perceived to afford or threaten self-promotional possibilities. And in turn, they activate distinctive and characteristic ways of processing information, and subsequent response and coping dynamics in order to secure self-promotion or self-restoration.

In the second section of this chapter, we discuss the primary components of this process of self-regulation that is expressed in self-signatures of personality and individual differences. We describe supporting research that shows the operation of individual differences in shaping these processes. The last section examines some of the key features and implications of the proposed self-regulatory approach. Our overarching goal in this chapter is to elaborate an approach that integrates personality process and self-regulation by contextualizing issues of self-regulation in a broader framework. It views individual differences in self-regulation as reflecting differences in meaning systems in self-construction in light of distinctive identity goals. These goals in turn guide the characteristic self-regulatory strategies that develop. The relevance of the approach to personality is demonstrated by showing how it illuminates the processing dynamics of different personality types.

## A Dynamic Self-Regulatory Processing Approach to Personality

The dynamic self-regulatory processing framework examines personality as reflected in a distinctive pattern of interacting intrapersonal and interpersonal self-regulatory mechanisms that the individual spontaneously engages in the quest of constructing and maintaining a desired self (see Morf, 2006, for a detailed description). The focus of self-regulation in this model therefore is expressly on the processes engaged to regulate specific contents of the self. We conceptualize the self as a coherent organized connectionist-like processing network meaning system of cognitive-affective representations and processes (Mischel & Morf, 2003; Morf & Horvath, 2007). These become activated in response to events (social or intrapsychic) that engage the system and are tagged as self-relevant. Activation then spreads through the system across the current cognitive-affective links, each time subtly updating and changing them. The primary advantage of such a conceptualization is that it makes it possible to consider many different processes at various levels—working not serially but in parallel, and without need of a single central control.

Importantly, the dynamic self-construction and self-regulatory processes unfold in the social world. That is, while some self-regulatory efforts are carried out in part intrapsychically, to a large degree they are socially embedded as people react to and shape their social and interpersonal worlds to be conducive to their self-concerns. Thus while, for descriptive purposes, one can separate intrapersonal and interpersonal self-regulatory mechanisms, in reality their boundaries are permeable, as they can function in parallel and there is continual exchange between them. The intrapersonal self-regulatory processes connote the cognitive and affective mechanisms through which people shape the meaning and favorability of information relevant to the self toward supporting a desired self-view. Examples include biased recall or reconstruals of events, or distorted interpretations of outcomes. Interpersonal self-regulation refers to social behaviors transacted to convey and obtain confirmatory feedback for preferred self-images, such as self-enhancing self-presentations or excuses for negative performances.

Although these self-regulatory efforts are "strategic" in the sense of being in service of a particular self-goal, we want to emphasize that they can be executed at *either* automatic or more deliberate levels. Indeed, as we will elaborate later, we assume that to a large degree self-regulation is transacted mostly automatically and with no explicit awareness. The development and continual evolution of the system occurs through a process of motivated social self-construction characterized by continuous reciprocal interactions between the system's dynamics and the demands and affordances of the particular social context. The goal-driven quality of the system implies that the system is not only reactive to situations, but also proactive in selecting and shaping situations to be maximally conducive to the individual's self-goals. Furthermore, the goals provide direction to the system and organize its various units and connections coherently.

## *If . . . Then . . . Self-Signatures in the Self-Construction Process*

Our analysis is in line with other social-cognitive processing models of personality, in which a person's thoughts, feelings, and behaviors vary as a function of specific features of situations in predictable and stable "*if . . . then . . .*" relations (Mischel & Shoda, 1995, 1998). Consistent with these models, we assume that dynamic processes are activated by particular types of trigger conditions, and then play out in ways that are stable and distinctive for a particular individual or personality type, and therefore allows one to explain characteristic contextual variations. Our conception of the self as a dynamic goal-directed self-regulatory system, however, also goes another step beyond these models to add a top-down element. It is the distinctive self-goals of an individual or personality type that define the "*ifs*" a person is drawn to, constructs, shapes, or transforms; and it is the self-goals that subsequently guide and constrain the "*thens*" that are expressed. That is, particular self-goals make individuals especially vigilant to detect and respond to opportunities, as well as potential departures or threats, for enhancing and protecting self-construal or validation. These perceptions then trigger the intrapersonal and interpersonal self-regulatory dynamics that are characteristic of the type. For example as illustrated in the narcissism example above: "*if*" their self-promotional efforts are blocked or stymied, "*then*" individuals high on narcissism become aggressive and insolent toward others (Bushman & Baumeister, 1998; Morf & Rhodewalt, 1993). Chronic self-construction and self-regulatory efforts therefore underlie the kinds of "*if . . . then . . .*" signatures that will be diagnostic of that individual or personality type. These signatures in turn become potential windows into the motivations and underlying processes that generate them. Thus the coherence and consistency in personality reflects the contextualized self-regulatory processing dynamics employed in the service of motivated self-construction and self-maintenance efforts (see Mischel & Morf, 2003).

The motivated meaning system of the self thus becomes revealed through its characteristic expressions in the social world. By observing which aspects of the self become activated in stable predictable patterns in which contexts, we come to learn about its underlying nature and meaning system. We refer to these chronic and characteristic "*if . . . then . . .*" patterns of cognitive, emotional, and behavioral variation that are played out in self-relevant contexts, and in concerted efforts to construct and regulate the self as "signatures of the self" (Mischel & Morf, 2003). Moreover, when "signatures of the self" are shared by a group of individuals, these common self-signatures can be used to understand the expressions and underlying mechanisms of a distinctive personality type (Morf, 2006). To refer back again to the narcissism example: Characteristic behavioral signatures observed in diagnostic situations that are relevant to the type lead one to conclude that an important self-goal of this type is to assert superiority, a goal, however, that coexists with a latent fear of worthlessness.

In this sense our view contrasts both with a stable trait perspective on self-regulation, and the personality as moderator perspective (see Hoyle, 2006). Self-regulation in our

approach is completely contextualized within the individual's self-system and the processing dynamics engaged to build and maintain this system. We now turn in more detail to describe this process of self-regulation that is expressed in self-signatures of personality and individual differences.

## Regulating Self-Signatures in Personality

The earlier examples of narcissistic self-signatures point to some of the broad constituents of the self-regulation processes, namely, the activation of self-goals, the monitoring and information processing of situational contingencies affecting the likelihood of implementing these goals, and the responses and strategies employed in goal pursuit. This is, however, only a rough outline of the facets of this process. These components further consist of other features and (sub)components. We consider some of these components now in turn, and describe research examples to illustrate how different personality types shape these processes. It should be noted that the selection and placement of these examples in the various subsections was almost arbitrary, because each usually could be representative of any one of the self-regulation process components. This underscores that in reality the processes work in concert, and that although the presentation here is linear, we do not assume that self-regulation is a linear process. Rather, we presume that it is dynamic and that all of these processes operate concurrently and in parallel.

### *Self-Goal Activation*

Important self-goals tend to be more or less chronically active, albeit to varying degrees. For example, people high on "rejection sensitivity" (RS) have as their main identity or self-construction goal to avoid the implications for the self of rejection and abandonment. Downey and colleagues demonstrated this automatic and chronic activation in an experiment, in which only high, but not low, RS participants reacted to paintings representing themes of interpersonal rejection with potentiated eyeblink startle magnitude (an indication of high negative arousal) compared to when viewing nonrejection themes (Downey, Mougios, Ayduk, London, & Shoda, 2004).

Individual differences in attachment styles similarly illustrate differential self-goal activation. According to Bowlby (1982/1969) humans have an innate motivational system to seek proximity to significant others in times of need with the goal of attaining protection and security. Persons who are anxiously attached, however, are constantly worried that others will not be available and thus are overly compulsive in proximity seeking. Thus for them the attachment system is chronically activated, as shown in priming experiments by Mikulincer and colleagues in which heightened accessibility of attachment themes and attachment figures' names were exhibited in both threat and nonthreat conditions, whereas in those securely attached they were

exhibited only under threat (Mikulincer, Birnbaum, Woddis, & Nachmias, 2000; Mikulincer, Gillath, & Shaver, 2002). In addition, anxiously attached individuals also showed heightened access to words connoting separation and rejection, in contrast to secure individuals, who had relatively slow access.

The findings for secure attachment thus make clear that in addition to self-goals being chronically active, situational cues also can activate or temporarily shift the currently accessible self-concept. This can occur regardless of, or in combination with, chronic accessibility effects, as has been shown repeatedly (e.g., Higgins, 1987, 1997; Kihlstrom & Cantor, 1984; Markus & Wurf, 1987). We also see this in our own work with high narcissists, whose primary goal is to affirm and promote perceptions of a grandiose and superior self which they at the same time have to protect from worthlessness. These individuals showed faster reaction times to worthlessness-related words, after subliminal priming with "failure" relative to neutral, in a condition when processing time was too short for correction processes to intervene (Horvath & Morf, in press). The increased activation did not occur for low narcissists.

Alternatively, dependent personalities see themselves as helpless and think they can only function appropriately when they get the support of powerful others. Evidence for the activation of the dependents' self-goal "to secure and maintain relationships with important others" could be found in their physiological responses to an interpersonal interaction (Masling, O'Neill, and Katkin, 1982). While after an interaction with a cold and unfriendly confederate, both dependent and nondependent personalities showed an increase in physiological arousal, physiological arousal was suppressed in high dependents after a warm and comfortable interaction.

These temporary increases in accessibility can lead not only to behavior that is consistent with important self-goals (as in the previous examples), but also to behavior that is in conflict with these goals. Such contrast effects are shown in research for example, on "restrained eaters" who, when primed with words reflecting the pleasure of eating, subsequently show an inhibition of words in the diet domain, even though the control of eating behavior is of chief importance to them (Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008).[1]

### *Monitoring and Information Processing*

Whether goals are chronically activated or situationally induced, they impel the individual to monitor the environment and process goal-relevant information and occurrences. Psychobiologically two broad motivational systems have been identified that correspond to different sensitivity and reactivity to cues for incentives and threats (e.g., Gray, 1990, Carver, 2005). The appetitive approach system is sensitive for potential positive outcomes (opportunities) and rewards, drawing attention towards them and setting off approach-related behaviors. The aversive inhibition system, in contrast, scans for and orients attention toward potential negative outcomes and threat, triggering avoidance or withdrawal behaviors (Derryberry & Reed, 1994). At the personality level,

the former tends to be associated with extraversion and positive affectivity, and the latter with neuroticism and negative affectivity (Watson, Wiese, Vaidya, & Tellegen, 1999). In the remainder of this subsection we focus on how individual differences are reflected in monitoring for, and processing, goal-relevant information, in interaction with the two motivational systems.

*Biased and selective scanning.* Active goals have been shown to have primary and even preconscious effects on information processing, directing implicit monitoring of internal or external cues connoting threats or opportunities for goal pursuit (see Bargh, 1990, for a review). In research by Moskowitz (2002), for example, when individuals were induced to believe that they were not meeting their goals of being good athletes or being egalitarian, attention was drawn to goal-relevant stimuli, even when those were to be ignored or occurred too fast for conscious control. With regard to more chronic individual differences, Bargh and Pratto (1986), after assessing the chronic accessibility of four trait dimensions (intelligence, sociability, rudeness, and conceit), had participants perform a Stroop task that included adjectives corresponding to all four traits. Participants showed longer response times to name the color when the words related to their chronically accessible trait, no matter whether the trait was socially acceptable or unacceptable.

The same chronic vigilance was shown for anxious individuals who are intent on avoiding anxiety-inducing threatening events, and are thus attuned to protecting the self from potential threat. Participants executed a dot probe task, in which they had to respond to a cue, which was displayed at the same location of one of two stimuli presented simultaneously on the previous screen—one representing the category of interest (e.g., anxiety) and the other neutral. Faster reactions were found for trait anxious individuals when cues were presented at the previous location of the anxiety item, indicating an orienting bias or hypervigilance towards the briefly presented threat stimuli (Bradley, Mogg, & Lee, 1997).

Another study examining personality differences showed that people with low trait self-esteem had significantly greater rejection interference on a Stroop task than acceptance interference. Participants with high self-esteem showed no difference between acceptance and rejection stimuli (Dandeneau & Baldwin, 2004). This is consistent with research on the sociometer theory of self-esteem, which holds that trait self-esteem reflects one's history of experienced real and imagined rejection, and predisposes low trait self-esteem people to monitor the environment for rejection rather than acceptance (Leary & Baumeister, 2000).

*Appraising social stimuli.* In addition to leading individuals to monitor the environment for goal-relevant information, individuals' chronic goals for the self also affect their appraisals of and inferences about this information. In one study, high rejection-sensitive individuals, for example, were shown to interpret an ambiguous social event (a sudden, unexplained departure by another participant) as rejection, in contrast to low RS individuals who made other inferences, such as a likely time constraint on

the part of the other (Downey & Feldman, 1996). Thus, because individuals high on RS are hypersensitive and constantly monitoring for potential rejection, this also appears to facilitate the inference (falsely or correctly) of threat-relevant cues and appraisals in line with a desire to shield their goals. Similarly, anxiously attached individuals have also been shown to appraise stimuli in ways that seem to offer the potential to circumvent rejection. Meyer, Pilkonis, and Beevers (2004) found anxious attachment style to be correlated with a tendency to rate neutral faces as more rejecting, less friendly, and less trustworthy on bipolar adjective scales, even when controlling for concurrent affect.

Dependency behavior also has been shown to vary as a function of how dependent individuals appraise the situation's differential affordances for meeting dependency goals. As an example, dependent participants undercut their own performance in a dyadic task if their focus was to get along with their peer, but they engaged in performance-enhancing behavior if they appraised the situation as an opportunity to please an authority figure (Bornstein, Riggs, Hill, & Calabrese, 1996).

In a related vein, high narcissistic males reported the most positive affect and enjoyment when a task was framed to be about performance evaluation and interpersonal competition, in contrast to low narcissists who did so in a learning and mastery situation (Morf, Weir, & Davidov, 2000). Thus, instead of reduced intrinsic motivation and performance apprehension that is typically observed in performance and evaluative contexts, narcissistic men were stimulated by this situation. Presumably this occurred because they appraised the situation as an opportunity conducive to their goal pursuit to demonstrate superiority and competence relative to others. This is also consistent with other research showing that narcissists perform better if the situation is presented as an opportunity to self-enhance and therefore garner the admiration of others, which for narcissists is a goal-consistent situation (Wallace & Baumeister, 2002).

*Expectations regarding gains and losses.* Expectations about the likelihood and value of potential gains and losses play a large role in determining the self-regulatory mechanisms an individual draws on once a situation has been interpreted as relevant to his or her self-goals. In the face of failure or threat, for example, people will employ strategies to rectify or undo the threat if they think they are likely to succeed, but they will withdraw or disengage if they doubt their ability (Carver, Blaney, & Scheier, 1979). Such outcome expectations depend on the one hand on one's ability estimates, but also on one's beliefs about the malleability of the dimension in question. Entity theorists, who believe a characteristic or ability is fixed and unchangeable, will employ very different strategies than incremental theorists, who believe an attribute is learned and can be improved (Dweck, 2000). The former can only utilize mechanisms that lessen or diffuse the implication of failure (or augment the implications for success), while the latter can actually step up their efforts in the hopes of performing better on a subsequent trial. Furthermore, the nature of the self-regulatory strategy engaged will also likely depend on individuals' relative weighting of the importance of gains and losses. This, in turn, is influenced by the individual's general orientation towards promotion and prevention concerns (Higgins, 1997).

People with a promotion focus are concerned with gains, and are thus more worried about committing failures of omission, that is, of missing out on an opportunity for something good. Thus they are more likely to engage in "risky" response bias or behavior, for example, a bias for saying "yes" in a recognition memory task (Crowe & Higgins, 1997); whereas the reverse is true for individuals with a prevention focus, who tend to be more conservative. They are more worried about failures of commission, that is, of committing a mistake, making an error, or doing something wrong (see Higgins & Spiegel, 2004 for a review). Individuals with high self-esteem generally have more positive self-views and are more likely to have high expectations regarding their ability (Blaine & Crocker, 1993). Thus they are more focused on promotion, that is, more concerned with approaching success than avoiding failure. Indeed, they have been shown to self-enhance more directly, and to respond to threat by emphasizing their abilities and discounting negative feedback (Blaine & Crocker, 1993; Schlenker, Weigold, & Hallam, 1990; Vohs & Heatherton, 2001). Low self-esteem individuals, in contrast, have more negative beliefs about the self and thus will adopt more avoidance or preventative strategies such as focusing on their interpersonal qualities and seeking acceptance, instead of trying to redress failure directly (Baumeister, Tice, & Hutton, 1989; Vohs & Heatherton, 2001).

In terms of self-theories, students whose self-esteem was contingent on academics showed drops in self-esteem and higher negative affect following failure (relative to success), but only if they had been primed with an entity theory of intelligence (Niiya, Crocker, & Bartmess, 2004). These effects were eliminated when they were primed with an incremental theory, and they did not hold for those whose self-esteem was not contingent on academics—thus showing that in both of these instances, expectations for success were still in place.

Unsurprisingly, narcissists, particularly males, tend also to endorse a more self-promotional orientation. While male low narcissists and females were shown to curb their self-promotional motivations and reduce their performance aspirations in a situation in which they would potentially be held accountable for a deficient ability, male high narcissists did the opposite and augmented their self-promotional orientation. They indicated that their motives and intentions were to impress the other in the upcoming interaction; they set higher performance expectations, and indicated that they expected to meet them (Morf, Davidov, & Ansara, in preparation).

Before concluding this subsection, we note that expectancies and value regarding goal attainment can interact in interesting ways. For example, in contrast to promotion-focused individuals, who are most motivated by high expectancies of goal attainment, when attainment also had a higher value (success was related to more important outcomes), prevention-focused people were found to be more driven by the goal's value. Indeed, for the latter the effect of expectancy on commitment became smaller, as the value of goal attainment increased (Shah & Higgins, 1997). As a consequence, individuals with a prevention focus might become "stuck" in self-regulation attempts, consuming all resources that have little chance of ever succeeding.

In sum, activated self-goals—whether chronic, or situationally induced—affect monitoring of information and bias the processing of social stimuli in line with one's self-goals. Monitored for cues connoting threats or opportunities for goal pursuit occurs even at implicit and preconscious levels. Individuals' chronic goals for the self further affect their appraisals of and inferences about this information. These appraisals then, in interaction with the person's expectations about the likelihood and value of potential gains and losses, shape the self-regulatory strategies employed.

### *Self-Regulation Strategies: Shaping Opportunities and Threats*

Whether the general direction of self-regulation is one of approach and focused on promotion, and thus more offensive, or whether it is more one of avoidance, or prevention-focused, and thus more defensive, depends on the whole on the valence of the event and the individual's expectations regarding gains and losses.[2] The intensity of the response on the other hand, is largely determined by the level of arousal. In the following subsection we illustrate preemptive tactics, either to take advantage of opportunities, or to diffuse potential threat, as well as reactive responses to capitalize on success or deal with threat, once an event is inevitable or thought to have occurred.

*Taking advantage of opportunities.* When individuals regulate self-goals by trying to capitalize on opportunities, the underlying strategies can generally be characterized as offensive and might include some risk taking. One way to set oneself up for opportunities is through the selection of one's social contexts and interaction partners. Narcissists select them for self-enhancement purposes. They have been shown to be drawn to romantic partners who possess highly valued qualities and who are also admiring, but not to find caring individuals particularly attractive (Campbell, 1999). Thus, narcissists select partners who are similar to their ideal self—attractive and successful; presumably because this type of romantic partner can provide them with self-esteem and status. Furthermore, recall that narcissists also seem to thrive in competitive contexts (Morf, Weir, & Davidov, 2000). They were found not only to enjoy such situations more, they even persisted at the task after the study was over and there was no longer any external need to continue. Thus narcissists may chose competitive situations over others, or alternatively shape noncompetitive contexts in order to pursue their prime objective of demonstrating their presumed superiority.

In the same way, dependent personalities who are preoccupied with securing and maintaining close supportive relationships will try to pave the way for others to "take care of" and protect them. They were found to be willing to wait longer than nondependents to discuss positive test results with a professor who was portrayed as able to offer future help and support, but not for one who was not going to be available in the future (Bornstein, 2006). Furthermore, this effect was even larger following helpless self-schema activation through subliminal priming, thus increasing the salience of the

self-goal. These results show that the perception of opportunities for self-goal pursuit is a necessary condition for activated self-goals to influence behavior.

Opportunities can be taken advantage of not only preemptively, but also after an event has occurred, for example, by shaping social information to make it maximally conducive to supporting one's goal pursuit. A particularly pervasive and favored strategy by narcissists is the tendency to make self-aggrandizing attributions for successful outcomes (Rhodewalt & Morf, 1995, 1998). In one study, despite receiving noncontingent feedback, narcissists took more credit for success by attributing it to their superior innate ability, thus enhancing the impact of positive feedback (Rhodewalt & Morf, 1998). Interestingly, when doing so, they appeared to be oblivious to the fact that making such claims has the potential to boomerang down the road, should they not be able to replicate their performance. When this indeed came to pass, narcissists then reacted with extreme anger and a drop in state self-esteem to subsequent failure. It appears that their extreme focus on capitalizing on successes makes them ignore the potential risks inherent in their strategies.

Another interesting example of shaping social information showed that individuals with a promotion focus generated more alternative hypotheses about the causes of another person's observed behavior than did those with a prevention focus (Liberman, Molden, Idson, & Higgins, 2001). Moreover, they were also found to be less likely to generalize from one instance of behavior to behavior in a new situation. Again, this illustrates that those with a high promotion focus try to maximize opportunities for hits, because having many possible explanations increases the likelihood of including the correct one. Prevention-focused individuals, on the other hand, are being conservative, increasing the opportunity of rejecting wrong (or perhaps particularly feared) categories, thus playing it safe.

*Responding to anticipated or real threat.* While sometimes people may find themselves relatively unencumbered and unimpeded to pursue opportunities for realization of their self-goals, the opposite occurs in situations in which the self-goal is (or seems to be) under threat. Just as with opportunities, strategies to handle threats can be either preemptive or reactive. As described earlier, individuals high on rejection sensitivity overestimate the danger of rejection, and as a consequence they try to minimize this threat. In contrast to narcissists, high RS individuals use rather defensive prevention strategies. To prevent possible anticipated rejection, high RS individuals often overaccommodate in relationships, for example, by suppressing personal needs to reduce interpersonal conflicts (Ayduk, May, Downey, & Higgins, 2003). But the same study also found them to reduce involvement or commitment to the relationship as another prevention strategy.

Another preemptive strategy to circumvent threat is to inhibit or suppress the threatening material before allowing it to enter conscious information processing. Persons with an avoidant attachment style, who distrust others' goodwill and thus try to maximize distance and instead to build personal strength and self-reliance, seem to avail themselves of such a strategy. Although when subliminally primed with threat, avoidant

individuals, like their secure counterparts, show no particular activation of separation and rejection themes, they react to the addition of a cognitive load with heightened accessibility, now resembling people who are anxiously attached. The cognitive load seems to have interfered with their usual mental suppression strategy used to prevent the activation of distancing worries in stressful contexts (e.g., Mikulincer et al., 2000).

Likewise, narcissists preemptively suppress feelings of worthlessness in situations of potential ego threat. In the sequential priming study described previously, when their processing time was limited, narcissists showed faster reaction times to worthlessness-related words after subliminal priming with "failure" relative to neutral; however, with increased processing time, narcissists actually had slower increased reaction times to worthlessness stimuli following an ego-threatening prime (Horvath & Morf, in press). Thus the strong connection between ego threat and worthlessness shown by narcissists enables fast initiations of unconscious avoidance of worthlessness.

When threats cannot be prevented, one may still try to diffuse them. Individuals high on RS attempt to do so again using relatively defensive strategies. In a study in which individuals received rejection responses from Internet group members, high RS men were willing to ingratiate by carrying out tedious and menial tasks for a group, and to make a larger monetary contribution to the live meeting of the group (Romero-Canyas & Downey, 2005). In another study, RS predicted ingratiating behavior for both genders towards the experimenter (picking up a box of spilled thumbtacks) following rejection. Thus, in order to try to obviate experienced rejection, high RS individuals will apparently go to great length to repress the self's needs in order to regain acceptance from a group.

In contrast, high narcissists continue to use offensive strategies even following ego threat, in order to conserve their grandiose self-view. When outperformed by another person on a task that was relevant to the narcissist's self-definition, for example, they handed the better performing other a devaluating and derogatory evaluation (Morf & Rhodewalt, 1993). This strategy allows them to reduce the social comparison threat and at the same time to enhance their feeling of superiority. Or in another experiment, unlike low narcissists, who conformed to social accountability demands by self-presenting more modestly when a deficient ability was likely to be uncovered by an expert, narcissistic men actually stepped up their self-enhancement (Morf et al., 2008). Presumably, for high male narcissists, self-promotion is much more important than social decorum or correctness; a motivation that was additionally fueled by an expert, as an expert's opinion is more meaningful than that of a layperson. Thus, although self-enhancement toward an expert is more risky, as it is less likely to be believed, there is also more to be gained. Thus, once again for high narcissists despite the risk, the potential gains seem to outweigh the cost.

*Offensive vs. defensive personality styles.* As is clear from the foregoing examples in this subsection, there are many strategies to regulate the pursuit of one's self-goals. Interestingly it becomes apparent that different personality types seem to show characteristic preferences for how offensively versus defensively they pursue these self-goals.

Most illustrative are the differences between narcissism and rejection sensitivity. Individuals high on narcissism are temperamentally extraverted, characterized by sensation seeking and risk taking, and on the whole appear to be pursuing a maximal gain strategy, aimed at capitalizing on success, no matter how risky (see Morf & Rhodewalt, 2001a for a review). They seem to orient toward gains and positive outcomes, preferring offensive strategies such as aggressive self-promotion, even when modesty would be more socially appropriate. They take credit for successes and blame situational factors or others for their failures. By contrast, protective self-presentations characterize rejection-sensitive individuals trying to avoid a potential negative outcome or inference. This defensive style involves escaping risk and is characterized by avoidance and withdrawal. In other words, while rejection-sensitive persons seem to pursue the tenet "better safe then sorry" (see Pietrzak, Downey, & Ayduk, 2005), narcissistic self-regulation might be best described as "better risky than sorry."

*The role of self-regulation skills.* A final topic to touch on, before concluding this subsection, is the role of broad self-regulatory skills. These greatly influence an individual's abilities to meet important self-goals, and they have the potential to moderate the effect of personality on self-regulation. This is particularly evident following threat, as negative events seem to limit self-regulation strategies for many individuals. Dual-systems theories of cognitive–emotion interaction (e.g., Metcalfe & Mischel's, 1999, hot versus cool, or Epstein's, 1994, explicit versus implicit differentiation), describe such situations as unbalanced, because the emotional hot system dominates the more rational cool system. This might endanger self-goals, but can be regulated by boosting the activity of the cool system, through the use of strategies such as self-distracting, or mentally transforming events in ways that strategically cool them (e.g., thinking of a pretzel stick as a log instead of as crunchy, salty, and delicious). Individuals who possess such self-regulatory skills have an advantage in the pursuit of self-goals.

For example, after actual rejection, high RS individuals might see (or have) no possibilities to restore their striving for interpersonal acceptance. As a result, they then often react aggressively and with hostility against the rejector. This is a result of the dominance of the hot emotional system, but it makes the situation worse (see Pietrzak, Downey, & Ayduk, 2005). Priming studies have indeed confirmed an automatic association between rejection and hostility for RS (see Ayduk, Downey, Testa, Yen, & Shoda, 1999). However, aggressive or hostile behavior after rejection is not inevitable. General self-regulation skills, such as to down-regulate negative affect, or deploy attention to nonthreatening stimuli, can buffer the otherwise often maladaptive reactions. As an example, high ability for delay of gratification has been shown to moderate negative effects of high RS. Preschoolers with high delay of gratification abilities exhibited less aggression and were more accepted by their peers than RS individuals with low delay of gratification abilities (Ayduk et al., 2000). More specifically, the important skill seems to be the ability to focus on the cool rational components of the rejection situation instead of letting the hot affective-driven system dominate one's behavioral reactions (Ayduk, Mischel, & Downey, 2002).

Other examples of important skills that could moderate the effect of personality are the ability to up-regulate positive affect in face of difficulties and problems ("self-motivation"), and the ability to down-regulate negative affect once it is aroused in face of threatening and painful experiences ("self-relaxation") (Kuhl & Kazén, 1999). Baumann, Kaschel, and Kuhl (2007) demonstrated that the connection between low sensitivity to positive affect (i.e., independent, schizoid-like personality) and reduced emotional well-being was tempered by self-motivation. It held only for those low on this ability, but not if they had ability to up-regulate positive affect. In the same study, high self-relaxation served as a buffer between the negative connection between high sensitivity to negative affect (i.e., self-critical, avoidant-like personality) and psychosomatic symptoms.

There are clearly many other important skills that can moderate otherwise negative self-regulatory dynamics. These include, but are not limited to: empathy, theory of mind, and role taking ability, in order to be able to understand and relate to another individual, as well as the ability to make subtle discriminations between different types of situations, so one can adapt to their specific affordances and constraints. It is beyond the scope of this chapter to consider them all; we merely provide the two specific examples to highlight the potential importance of examining general self-regulatory skills in addition to the characteristic self-regulatory strategies (or their typical "*if . . . thens . . .*") preferred by an individual or a personality type.

## Self-Signatures Emerging From a Processing System: Some Key Features

In this concluding third section we reflect on, and elaborate, some of the key features of the processing system we have outlined. The first is the dynamic, proactive, goal-directed nature of the system—a feature that makes the system coherent, despite its remarkable complexity. It is a system that functions at many levels concurrently, and it encompasses the biological as well as the psychosocial histories of the individual, playing out cognitively, emotionally, and behaviorally, both automatically and sometimes—even if less commonly—in effortful ways. We discuss the role of state self-esteem as a gauge providing information about one's relative progress in meeting one's self-goals. We also consider to what degree the system operates automatically and when controlled processes are likely to intercede, as well as some of the comparative advantages of either mode. This section concludes with a brief discussion on how the system evolves.

### *Dynamic and Recursive, But Also Coherent (and Stable)*

Conceptualizing personality or individual differences in terms of motivated meaning systems of self-construction, and regulation in reference to distinctive identity goals,

clearly highlights the dynamic nature of this process. At the center are the common distinctive *self-signatures* of the personality type—the chronic and characteristic "*if . . . then . . .*" patterns of cognitive, emotional, and behavioral variation that are played out in service of constructing and regulating the desired self. While at any one time the self-signatures reflect the current state, or momentary "solution," of a connectionist network for satisfying the mutual constraints inherent within its network of links, the system is nevertheless simultaneously flexible and dynamic. It is flexible in that it continuously accommodates and assimilates situational input from the social world within which it is contextualized; and it is dynamic as it represents a motivated action system that selects and construes situations and generates behaviors (which in turn further shape these situations).

Moreover, the self-regulation processes all operate in parallel and at multiple levels concurrently; "*if . . . then . . .*" patterns can run more automatically or more controlled, more implicit or more explicit, more affective or more cognitive, and so on. Operations at these various levels can interact and/or conflict with each other, depending on the internal and external trigger conditions that are encountered. For example, individuals with implicit high, yet explicit low, dependency strivings were found to exhibit low levels of direct help seeking yet high levels of indirect help seeking, while the reverse was true for those with the reverse discrepancy in implicit–explicit dependency needs (Bornstein, 1998). Apparently paradoxical behavior can be understood as the result of parallel and conflicting operations of the system at multiple levels (see Morf & Rhodewalt, 2001b, for more detail). Narcissistic self-regulation, for example, appears to be governed both by explicit grandiosity, and by implicit vulnerability. If this vulnerability is activated through a threat (or potential thereof), affirming the grandiose self-concept becomes of paramount importance, while socially appropriate behavior becomes less critical to their self-goals (Morf et al., 2008). Thus we observe such seemingly paradoxical events, as when narcissists engage aggrandizing self-presentations when modesty seems like the more adaptive response (or more likely to get them the desired outcome). In short, as highlighted by these examples, it is beneficial to work in parallel at both covert levels (i.e., mental representations), as well as their conversions into overt behaviors in specific situations, as the discrepancies found between the two may be informative and point to underlying dynamics that reconcile them.

The system is also reciprocal and recursive with the various processes continually modifying each other. For example, the initiation of prevention strategies influences the subsequent scanning (for potential losses), and colors appraisals and expectations, which finally in turn also supports the chosen strategy and maybe even enhances its execution. Such activation of goal constructs can occur consciously or without awareness, and can take place rapidly. Thus the system can shift flexibly and sometimes swiftly in response to both internal and external features, and as a result it has plasticity and potential for change. Change in the system occurs slowly though, as there is a relatively stable underlying pattern of connection links between nodes. Thus shifts may take place without substantial change in chronic representations (Wheeler,

DeMarree, & Petty, 2007). Over time, change results from subtle adjustments of association strengths among the units as different parts of the system are activated and reconstructed in particular contexts. Throughout, however, coherence and consistency is provided through the core personal goals and motivated self-construction and maintenance efforts that organize the system. The processing system thus intrinsically generates both enduring overall levels of behavior, as reflected in overall stable levels and types of characteristic social behavior (e.g., sociability, aggressiveness), and also in stable, potentially predictable patterns of variability across different situations (the characteristic "*if . . . then . . .*" self-signatures).

### *Self-Esteem Fluctuations and Enjoyment as Gauges in the Background*

How does the self-system know how it is doing in terms of meeting its self-goals? Like Leary and colleagues (Leary, 2004; Leary & Baumeister, 2000), we believe that state self-esteem operates like an internal, subjective gauge in the background. Consistent with Leary, in our approach it is explicitly these self-relevant feelings—whether one feels good or bad about *oneself*—that characterize state self-esteem that are relevant, as it is specifically contents of the self that are being regulated. However, in contrast to the perspective of Leary's sociometer model, we do not believe that it is one's relational value that is being monitored in general. Rather, we assume that what is being monitored is more particularly related to the individual's self-goals and serves as an index of how well those goals are being served. For individuals high on rejection sensitivity or anxious attachment this may indeed be their relational value. However, for narcissists one might call this their "worth/superiority value." That is, they are not concerned with close nurturing relationships, but rather with their perceived superiority over others. Indeed they see themselves as above average on agentic traits, but as below average on communal traits (Campbell, Rudich, & Sedikides, 2002).

Given that the self is socially contextualized, of course one could argue that in the end this also translates into "relational value." However, we would like to advocate for more specificity. Feelings of acceptance and social inclusion can be based on many things, and will be meaningful to different people for different reasons. Narcissists (compared to less narcissistic individuals), for example, were found to feel significantly more included if they were admired, had their self-esteem supported, and felt influential, rather than through approval-based acceptance (Rhodewalt, 2005). Even implicit self-esteem has been shown to be multifaceted, with narcissism correlating with high implicit agency but not with implicit communion (Campbell, Bosson, Goheen, Lakey, & Kernis, 2007); and narcissistic reactions being predicted by a combination of high levels of implicit self-attraction but low levels of self-liking (Sakellaropoulo & Baldwin, 2007).

State self-esteem as a gauge is more or less relevant at various phases of the self-regulatory process. On the one hand, impending fluctuations in state self-esteem give

feedback about anticipated dangers and opportunities for the realization of self-goals. That is, it helps the individual assess whether something should be interpreted as a potential threat or opportunity for self-construction, so that he or she can react quickly, early, and preemptively to ensure success. Furthermore, state self-esteem provides feedback about progress versus remaining discrepancies toward one's goals. This is similar to Carver and colleagues' notion of a monitoring loop, in which emotions signal how well the self-regulation is progressing (e.g., Carver, 2004). Finally, which self-regulation strategies an individual applies in the end also will depend on current state self-esteem. If the divergence picked up by changes in state self-esteem is small, more subtle strategies will suffice (e.g., external attributions for failure); whereas if the divergence is larger, more massive interventions are needed (e.g., aggression toward or derogation of the other).

We illustrate the operation of state self-esteem as a gauge here, because this self-relevant feeling is particularly pertinent to the formation of self-signatures in regulating one's desired self. However, this by no means captures all the relevant emotions involved in self-regulation, nor all the complexity between the systems (see Carver, 2004 for a review). Although we cannot review this sizeable literature here, we briefly touch upon the experience of enjoyment as one more emotional by-product that strikes us as particularly interesting, as it affects the potential persistence in employing a particular self-regulatory strategy. As described earlier, narcissistic males reported the most enjoyment and persisted longer when a task offered the opportunity to compete with another person, while low narcissists preferred learning or mastery situations (Morf, Weir, & Davidov, 2000). Thus it appears that activities are more enjoyable if they are supportive of one's primary self-goal. Theoretical and empirical support for this can be found in the "goal matching" model by Harackiewicz and Sansone (1991) as well as the idea of "regulatory fit" proposed by Higgins (2000).

Harackiewicz and Sansone's model stresses the importance of the congruence between the task goals currently supported by the environment and the chronic higher order purpose goals the individual brings to the situation in promoting enjoyment and interest. Regulatory fit theory suggests that apart from congruency between target goal and chronic goal, a fit between people's general regulatory orientation and the type of strategy employed affects task enjoyment. Freitas and Higgins (2002) demonstrated this by manipulating participants' regulation state (duty/obligation vs. hope/aspiration) and the framing of a search task. In the vigilance condition, participants were instructed "to find the harmful four-sided objects," whereas in the eagerness condition the same objects were termed "helpful." The results showed that participants in conditions of regulatory fit (duty and vigilance, hope and eagerness) experienced the task as more enjoyable than in the nonfit conditions. In sum, while self-esteem may be continually operating as a gauge in the background assessing one's relative progress toward goal realization, the experience of enjoyment may be particularly pertinent in determining one's persistence and reapplication of particular self-regulatory strategies.

## *Automaticity and Control*

As noted at the outset, regulation of the self is transacted to a large degree automatically and with no explicit awareness. This is consistent with considerable accumulating evidence that in effective self-regulation conscious processes are not necessarily typical, and indeed are operating far less than previously thought (Fitzsimons & Bargh, 2004). Provided that self-construction and regulation processes are running more or less continuously—if to varying degrees—it makes sense that they need to proceed largely automatically for the individual to function effectively. As we saw in the examples previously described, automaticity can be involved in every stage of the "*if . . . then . . .*" construction of the self-signatures. Self-goals can be automatically activated, as demonstrated from experiments showing heightened accessibility of goal representations following (subliminal) priming of "*ifs*" relevant to the distinctive concerns of the personality type (e.g., Horvath & Morf, in press; Mikulincer et al., 2002). Similarly, at the perceptual level, biased and selective scanning for situational parameters relevant for goal pursuit appears to occur automatically and at implicit levels, as supported for example by studies on Stroop interference (e.g., Dandeneau & Baldwin, 2004). This automatic activation of goal conditions further affects individuals' appraisals, and processing of ambiguous goal-relevant stimuli or conditions are interpreted in correspondence with one's goals, as well as their preferred self-regulatory responses (e.g., Bornstein, 2006; Downey & Feldman, 1996).

Together, these findings across multiple personality dimensions provide ample evidence that regulation in form of self-signatures proceeds to a considerable extent outside of awareness. The concept of implementation intentions and plans (Gollwitzer, 1999) supports the idea that "*if . . . then . . .*" patterns can operate automatically, even if they initially may be formed and rehearsed deliberately. Specifically, Gollwitzer and colleagues have demonstrated how individuals can self-regulate by specifying particular "*if . . . then . . .*" contingencies that stipulate goal-directed behavior when a particular situational context or cue arises (e.g., Gollwitzer, 1999; Gollwitzer, Bayer, & McCulloch, 2005). These so-called implementation intentions seem to work by creating a mental association between the cue and the goal-directed behavior, making the cue highly accessible, so it is detected readily, which then evokes the intended behavior quickly and automatically, without conscious effort. Thus people can use these implementation intentions strategically by first purposively explicating the desired goal, and specifying a useful contingency, but then delegating control of their behavior to the environment. This allows the behavior to be enacted efficiently and effortlessly (although the successful application may require a certain amount of practice).

This raises the intriguing question of to what degree we are "at the mercy" of these unconscious and automated processes. As the self is so central a concern one can assume that it is more or less chronically active; thus nonconscious activation of self-relevant goals is likely pervasive. Nevertheless, the activation and resulting behavior will vary

in strength and even direction (sometimes assimilative, sometimes contrasting with the goal) depending on the currently active self-state and the present situational parameters (see Wheeler, DeMarree, & Petty, 2007, for a review of prime-to-behavior effects). Furthermore, situational cues will affect action only to the degree that the self-goal is activated, and if the cues are applicable to the goal. Consider, for example, the Bornstein study discussed earlier (Bornstein, 2006), in which dependency-related behavior (waiting for the professor) occurred only when (a) the dependency schema was activated, and (b) when there was an opportunity to satisfy the self-goal (i.e., when the professor would be available in the future). That is, even if a person was high trait dependent, he or she did not enact dependent behavior if the schema was not activated or the opportunity to fulfill the dependency need in the future was not available. Alternatively, it was shown that implementation intentions benefited goal attainment only when individuals had strong, not weak, goal intentions, and, in a second study, only when the situational context had activated a relevant goal (Sheeran, Webb, & Gollwitzer, 2005). Moreover, it is important to note that only goals (and goal–means relations) that an individual already possesses can be activated, but not those that are not part of his or her self-concept already. For example, activating the power concept prompted self-interested behavior for some people, but socially responsible behavior for others, depending on their associated goals (Chen, Lee-Chai, & Bargh, 2001).

In short, routine self-regulation processes likely run off automatically in the background much of the time, but they are obviously limited to conditions in which they are pertinent to the underlying goals. This automaticity has both benefits and disadvantages. On the one hand it is advantageous, as deliberate self-regulation has been shown to consume a lot of resources (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Moreover, there is even evidence to suggest that sometimes trying to use deliberate, intentional strategies that otherwise have been automated can disrupt the process, or even make it ineffectual (e.g., Dijksterhuis & Nordgren, 2006; Hassin, 2005).

Automated self-regulation, however, may also have its drawbacks. Although in service of one's goals, its adaptive value will depend on the adaptiveness of one's goals and one's particular "*if . . . then . . .*" contingencies. Despite their tremendous concerns and efforts to avoid it, people high on rejection sensitivity often bring on rejection through the very behaviors intended to deflect it (Downey, Freitas, Michaelis, & Khouri, 1998). Similarly, narcissistic people often undermine the self they are trying so extremely hard to build and affirm. In both cases, these self-fulfilling but self-defeating prophecies unfold because the "*ifs*" are triggered too readily, or sometimes unnecessarily, setting off "*thens*" that are excessive or not sufficiently matched to the objective situation. Self-signatures involve the regulation of one's most important and valued aspects of the self, thus the self-regulation is likely hot system affect dominated, which on the one hand makes it more automatic, and on the other more difficult to override by cool system functioning. Furthermore, because regulatory fit suggests that people will enjoy activities more if their strategies match their general orientation towards rewards and threats, this should make switching or altering preferred self-regulatory strategies more difficult.

In concluding this subsection, we highlight once more that despite being transacted to a considerable amount automatically, self-signatures are nevertheless strategic. They are sensitive to both the person's goals and to the affordances and demands of the current situation (even when the individual is not necessarily aware of either). Individuals high on avoidance, for example, have been found to react to various kinds of threatening situations with inflated explicit and implicit positive self-appraisals (Mikulincer, 1998). This effect was shown to disappear with the introduction of a bogus pipeline procedure, or the presence of a friend, both factors that limit the effectiveness of the strategy. Almost every example presented in this chapter could be similarly recruited to underscore this point. Finally, despite being transacted to a considerable amount automatically, we do not mean to imply, however, that one is never aware of one's self-regulatory efforts and dynamics. Undoubtedly, there are times one notices one's self-regulatory "*if . . . then . . .*" contingencies or one may even deliberately try to make oneself aware of them, in order to take charge of, or change, them.

### *Development and Self-Organization of the System*

Another question is how such systems, and broad individual differences in these systems, develop and evolve in the first place. Although the full answer is outside the scope of this chapter, there are some general points central to our key concerns here, which we note briefly. The system's origins are likely rooted in an innate psychobiological system, which motivates children to establish and maintain relationships with caregivers to obtain nurturance and security (Bowlby, 1982/1969). Caregivers' major task in early months is to help infants manage their distress, and in these interactions caregivers in essence "train" the infant in control of distress—a function that, as the brain develops, children internalize and take over themselves (Posner & Rothbart, 2000). From these interactions, children also learn what kind of person they need to be to feel safe and nurtured, and in turn, in order to feel good about themselves (see also Crocker & Park, 2004). Children thus acquire self-goals and goal–means relations ("*if . . . then . . .*" patterns) for self-regulation in these contingent interactions with their caregivers.

The form these interactions take, and thus the self-values and self-regulatory patterns that are learned, are the result of a complex interplay between the genetic biological predispositions (e.g., temperament) of both caregiver and child and parental socialization practices regarding rules and values (see Manian, Papadakis, Strauman, & Essex, 2006 for an excellent delineation of this process and interplay). For example, one might speculate that narcissistic behavior evolved in part from childhood experiences of obtaining affection through putting on cute performances, showing off abilities to earn applause, or otherwise impressing others (see also Raskin, Novacek, & Hogan, 1991). Such experiences become internalized as working models and are then later applied in new situations and relationships (e.g., Andersen & Chen, 2002). The formation of personality and individual differences in self-regulation thus stem from

these childhood experiences, but the process is neither simple nor linear, and is continually modified through other experiences over the life course (e.g., Fraley, 2002). As we saw in the last subsection, much of this process is not intentional or not even explicitly conscious; instead much of it seems to emerge spontaneously and has a self-organizing character. We concur with Carver and Scheier (2002) that a useful way to think about how a system of self-goals and goal–means relations evolves is through a combination and continual interplay of bottom-up and top-down processes.

As noted, we suppose that this system emerges through continuous reciprocal interactions between the system's self-regulatory dynamics and the demands and affordances of the particular social context. Thus, on the one hand, goals arise bottom-up from the intrinsic dynamics of the system as it operates in the world over time. And, as described by Carver and Scheier (2002), this self-organization occurs at every level of the process: perceptual, goal selection, and behavioral output. In this sense, individuals are virtually "stumbling into identity." This is also consistent with a connectionist model view of the self, wherein momentary output results from satisfying the mutual constraints inherent in the current network links, thus assuming no central processor or executive (see Mischel & Morf, 2003 for a detailed discussion on avoiding the homunculus). When these emergent patterns are reenacted over time, they are stabilized (at least to some degree) and become internalized as mental representations, to be reenacted later in new contexts. Although these reenactments often occur automatically and without conscious effort, they can also be recruited by a deliberate process, thus allowing for top-down control. The regulation and construction of one's identity is thus both "stumbled into" and in part regulated intentionally toward desired self-goals.

Finally, the structure that emerges from this process is one of networks of goal systems, in which superordinate goals—those that the individual considers most important—generally drive the direction and self-organization of the system, and in which then many subgoals also fall into place and operate in parallel. Consistent with a connectionist network analysis of the self, one can assume that important self-goals are more densely and more tightly connected with other nodes (i.e., have higher connection weights). The system's contextual sensitivity is due to continual construction processes wherein internal or situational cues activate and interact with prior stored information (Smith, 1996). Individual and personality differences, then, are the result of differences in the chronic accessibility of the units and, equally important, in the distinctive constellation and dynamic organization among them, as well as from the direction and extremity of people's reactions and responses while engaged in motivated and socially contextualized self-construction efforts. Differential accessibility and organization also contribute to enduring individual differences in the types of features of situations that people select and to which they are particularly responsive (for a similar account, see Mischel & Shoda, 1995).

In conclusion, self-construction, and thus the regulation of the self that is being constructed, is an intrinsically transactionist process: The theories of self (implicit or explicit) are based on and modified by the experiences in the interpersonal world, just as the latter are influenced by and in part created by those theories. Moreover, we

believe this self-regulation process, engaged in pursuit of one's most important and valued views of oneself, is in operation most of the time, even if often "quietly" and unnoticeably running in the background.

## Concluding Remarks

This chapter outlines a dynamic self-regulatory processing framework of personality, which conceives of individual differences as meaning systems of self-construction and regulation in reference to distinctive identity goals. We illustrate the functioning of these individual differences in meaning systems for various components and phases of this self-regulation process through research examples on diverse personality dimensions. Most of these aspects of the self-regulation process have been discussed elsewhere, both in work on broad general self-regulation principles, and in the work on the relevant personality dimensions. In this chapter, we integrate them and discuss their implications for personality and individual differences more fully. General models of self-regulation inform us about the "generic" operation of self-regulatory processes, regardless of accompanying personality differences; whereas personality approaches instruct us about the general nature or "flavor" particular self-regulatory responses are likely to take for a given personality type. It is not until both of these systems are integrated into one, however, that one comes to see how one might examine commonalities and divergences between distinctive dynamic self-regulation systems. this integration system allows one to establish the uniqueness in each type's self-construction system, and facilitating conceptual differentiations (or refinement of category boundaries) between personality types or subtypes.

The dynamics involved in individual and personality differences in self-construction, and its regulation, reflect a complex reality, and it would defy the dynamic character of human nature to try to describe it with isolated and static dimensions. Without a system perspective as presented here, it would be almost impossible to understand why people often seem to paradoxically undermine their own self-regulation attempts. We intend the general self-regulatory framework and process we outline to be viewed as a *terrain map* to be filled in with the specific dynamics and social, cognitive, and affective processes that describe and explain the unique features of a given personality type. The framework thus offers a guide for where to look for, and how to organize, the unique features and idiosyncratic dynamics of different self-construction types and to specify their distinctive signature and processing dynamics. The applications of such a dynamic self-regulatory approach promise to capture trait-like individual differences, while simultaneously shedding light on the psychological processes that underlie them. The visible products are the stable characteristic self-signatures that reflect both the specificity of the expressions of personality and their stability, and that in turn provide windows into the processing dynamics that generate them, as illustrated throughout this chapter.

## Notes

1 For general differences between goal priming and semantic priming see Förster, Liberman, and Friedman (2007).
2 Note that while we discuss approach versus avoidance and promotion versus prevention for our purposes as roughly parallel approaches, and indeed they are orthogonal at the system level (i.e., what reference points each system orients to), they are not completely overlapping at the strategic or behavioral levels (for a review see Higgins & Spiegel, 2004).

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# 7

# *Self-Regulation and the Five-Factor Model of Personality Traits*

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> *Gods and also men resent him who lives as an idler, in temperament like the stingless drones who wear away the labor of the bees by eating . . . Let it be important to you to keep your own works properly organized so that your granaries may become full.*
> (Hesiod, *Works and Days*)

Since the dawn of European literature, writers have exhorted people to exercise self-discipline in order to gain its benefits. Sometimes, as with Hesiod, they have recognized that failures of self-regulation may be attributable to temperament, but they, and their readers, continue to believe that natural limitations can be overcome by effective interventions. In this chapter we will review some of the ways that personality traits influence self-regulation, and some implications for efforts to enhance self-control.

Most contemporary research on self-regulation has focused on processes rather than individual differences. In fact, the term *conscientiousness* was conspicuously absent from the index of a recent handbook on the topic (Baumeister & Vohs, 2004). On the other side, scales to assess aspects of impulsiveness and constraint have been developed by several researchers (e.g., Buss & Plomin, 1975), but it is only recently that attempts to integrate trait and process models have been made (Hoyle, 2006). In this chapter we will survey the topic of self-regulation from the perspective of a comprehensive model of personality traits, the five-factor model (FFM; McCrae & John, 1992), in which a variety of specific traits are understood as aspects of five broad factors: Neuroticism (N), Extraversion (E), Openness to experience (O), Agreeableness (A),

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**Table 7.1** Factor Definitions and Some Related Traits or Facets

**Table not available in the electronic edition**

and Conscientiousness (C; see Table 7.1 for more information on the factors). We will first consider a general theoretical framework that specifies how traits are related to processes in shaping the individual's behavior and experience, focusing on processes that have been identified as central to self-regulation. Next, we classify individual difference variables relevant to self-regulation in terms of the FFM, noting the special importance of N and C. We discuss how aspects of C can facilitate the use of different techniques for achieving self-control. Finally, we consider implications of research on the FFM for understanding self-regulation and dealing with failures of self-control.

The terms *self-regulation* and *self-control* are variously defined and appear to refer to a variety of different traits, processes, and functions. At perhaps the broadest level are conceptions that address the extent to which behavior is controlled by the self. Research on locus of control (Rotter, 1966) concerns general expectations about the individual's ability to influence outcomes. The construct of self-efficacy, which is domain-specific (Bandura, 1997), suggests that individuals vary both in their capacity to act and in their perceived capacity to act, and that both of these are requisite to effective action. Most of us could not play a violin concerto, try as we might; but none of us would even try unless we believed we could. A gifted few can learn to do so after years of practice; this is an achievement of self-regulation in the broadest sense. Schulz and Heckhausen (1996) refer to this as *selective primary control*, or gaining direct control over the environment—in this case, the fiddle and bow.

From a process perspective, self-regulation is chiefly associated with goal attainment and its regulation through feedback and affective reactions (e.g., Higgins, 1987). From a trait perspective, much interest has focused on differences in *impulse* versus *constraint* (Carver, 2005). But it has become increasingly clear that several different, essentially unrelated traits (like sensation seeking and procrastination) are all described in these terms. They share a kind of formal or functional similarity, where impulse is seen in free, loose, spontaneous behavior, and constraint in narrow, tight, and deliberate behavior. Carver points out that in this sense these terms do not necessarily imply any intrapsychic conflict; the differences may be merely stylistic. The individual high in openness to actions who decides to try sheep's milk yogurt for breakfast follows an impulse that simply never occurs to the closed person eating his daily bowl of cornflakes.

Finally, a specific kind of self-regulation can be designated *self-control*. As we will use that term, it refers to situations in which the individual has two competing interests, one of which is considered better, wiser, or healthier in the long run than the other. McCrae (1976) described self-control not as a trait nor as a process, but as "the function of subordinating 'impulses' to 'higher interests'" (p. 4). That can be accomplished by several different processes or techniques, and can be facilitated or impeded by various traits. However, it is also possible to distinguish individual differences in self-control, because people vary characteristically in the success with which they subordinate impulses to higher interests, and trait self-control turns out to be chiefly related to low N and high C.

It should be noted that self-control can be either inhibitive or active—that is, it may be devoted to restricting impulsive behavior or to initiating and sustaining effortful activity. Failures of inhibitive control lead to addictions, emotional outbursts, and financial irresponsibility. Failures of active control lead to academic and occupational underachievement, poor physical condition, and empty granaries.

## Traits in Action

Previous research examining the implications of the FFM for self-regulation has primarily focused on correlational approaches linking personality dimensions to dispositional measures of self-regulation with little reference to the processes of self-regulation. In this chapter, we hope to make the case that the five-factor perspective can inform both trait and process concepts of self-regulation.

### *Five-Factor Theory*

For the present purpose, we adopt the perspective of five-factor theory (FFT; McCrae & Costa, 1996), a theoretical account that provides a comprehensive description of the basic structure of the personality system as well as its causal underpinnings and real-life consequences (see Figure 7.1). According to FFT, the five factors are endogenous *basic tendencies* that are rooted in *biological bases* and substantially heritable. These basic tendencies manifest themselves in *characteristic adaptations*, enduring patterns of psychological functioning which encompass attitudes, habits, and personal strivings as well as a person's *self-concept.* Characteristic adaptations develop as the result of an interaction between *external influences* and basic tendencies and, in turn, influence a person's overt behavior and experienced emotions that cumulatively constitute the person's *objective biography*. According to FFT, the five factors emerge from childhood temperamental tendencies, mature by adolescence and young adulthood, and remain comparatively stable thereafter, although modest changes in middle and late adulthood are observed (Roberts, Walton, & Viechtbauer, 2006). In addition to maturational changes, basic tendencies are also sensitive to external influences such as chemical exposure (e.g., Bellinger, Leviton, Allred, & Rabinowitz, 1994) or drug or substance abuse that may affect the biological bases of personality (e.g., Piedmont, 2001). This is indicated in Figure 7.1 by a dashed arrow from external influences to biological bases.

In the present context, FFT has the advantage of providing a clear framework for situating both trait and process models of self-regulation within a person's personality system. At the *trait level*, enduring aspects of self-regulatory patterns can be linked to specific aspects of a person's basic tendencies. Specifically, FFT would propose a causal pathway such that people's differential standing on the five factors determines

**Figure 7.1.** A representation of the five-factor theory personality system. Core components are in rectangles; interfacing components are in ellipses. Adapted from McCrae and Costa (2008).

their dispositional capacity for self-regulation. From this point of view, a person's standing on personality factors such as N and C would set upper bounds to his or her ability to exert self-control.

At the *process level*, FFT captures self-regulatory mechanisms in the dynamic pathways that link the basic building blocks of the theory (see Figure 7.1). Some of these dynamics are universal across individuals. Internalized cultural norms, for example, may limit the amount of aggressive behavior that even a highly hostile individual will display. In addition to such universal dynamics, individual differences in traits can of course translate into differences in dynamic processes. Individuals high in achievement striving, for example, may set themselves more challenging goals and react more forcefully when they detect a discrepancy between their goals and reality.

## *FFT and Process Models of Self-Regulation*

Over the decades, a variety of process models of self-regulation have been proposed (e.g., Carver & Scheier, 1982; Duval & Wicklund, 1972; Higgins, 1987). Although theoretical approaches differ in their relative emphasis on different aspects of such processes, most share a common set of components that are inspired by the information processing approach of cybernetics (Miller, Galanter, & Pribram, 1960; Wiener,

1948). Shared components include a set of behavioral standards, an evaluative mechanism that detects one's standing relative to these standards, affective reactions to one's self-evaluations, and, finally, a set of corrective mechanisms (see Hoyle, 2006). Conceivably, a person's standing on the five factors may influence all these components.

*Behavioral standards and goal setting.* Personality dimensions may influence the broad behavioral standards and specific goals that people adopt for themselves as well as the sources from which such standards are drawn. At the most basic level, personality may influence to what extent people are pulled towards desirable outcomes and/or pushed to avoid potentially negative outcomes. Indeed, several broad bodies of literature converge on the idea that behavior is governed by two independent motivational systems: an approach system related to positive affect and goal pursuit, and an avoidance or withdrawal system related to negative affect and threat avoidance (e.g., Cloninger, 1987; Gray, 1981; for a review see Carver, Sutton, & Scheier, 2000). Empirically, the relative reactivity of these systems has been linked to E and N, respectively (e.g., Carver & White, 1994; Depue & Collins, 1999; Harmon-Jones & Allen, 1997).

With regard to concrete achievement goals, one would expect that the approach orientation of extraverted individuals, as well as their greater assertiveness and activity, would lead them to adopt higher levels of challenge for themselves. The deliberation, organization, and achievement orientation of conscientious individuals likely translates into more explicit and challenging goals as well. Individuals high in N, in contrast, struggle with impulsivity and are primarily motivated to avoid the "antigoals" (Carver et al., 2000) of failure and dejection. Ill-defined achievement goals and lower self-set levels of challenge seem a likely consequence. Empirical evidence supports this pattern of associations; a meta-analysis examining the link between FFM traits and goal setting (Judge & Ilies, 2002) found that individuals high in C and E and low in N set themselves more challenging goals in the context of both task and job performance.

At a more specific level, research on *personal projects* examines interrelated sequences of action targeting a personal goal such as succeeding at an exam or improving an interpersonal relationship (Little, Lecci, & Watkinson, 1992). Consistent with a focus on avoidance, neurotic people experience their projects as more stressful and less meaningful and also feel less efficacious about their current and future progress, whereas extraverted and conscientious individuals report more efficacy and meaningful involvement in their projects (Little et al., 1992).

Personality may also influence the type and range of goals a person chooses to pursue. E and A, for example, are more strongly associated with interpersonal as compared to academic personal projects, whereas the effects of C and N do not differ across project domains (Little et al., 1992). Consistent with their focus on interpersonal harmony, agreeable individuals also focus more on cooperative achievements (Ross, Rausch, & Canada, 2003) and set themselves less challenging goals when it comes to their individual job and task performance (Judge & Ilies, 2002). Openness, in turn, is not associated with specific goal domains, but instead predicts the number of

personal projects that a person pursues at a given time (Little et al., 1992). Thus, while a closed person may strive for 2.14 children in a suburban home with a white picket fence, an open individual may pursue a teaching career by day, weld wire sculptures at night, and plan their next humanitarian project in rural Ghana on the weekends.

*Affective aspects of self-evaluation.* Once a set of goals has been established, people need to track their progress towards these goals. This requires an accurate assessment of their current standing on goal-relevant dimensions, which is then compared with the desired goal state. Not surprisingly, accurate self-assessments depend in part on the amount of attention that is directed towards the self (e.g., Gibbons, 1990). Although self-focused attention was initially examined as an independent dispositional concept (e.g., Fenigstein, Scheier, & Buss, 1975), more recent work (Trapnell & Campbell, 1999) suggests that self-awareness is related to personality. Specifically, N is related to rumination (a focus on injustices, losses, and threats to the self) whereas O is associated with more reflection (characterized by curiosity and epistemic motives; Trapnell & Campbell, 1999); people higher in O are more accurate in assessing their own performance (Schaefer, Williams, Goodie, & Campbell, 2004).

The ruminative focus on negative material among more neurotic individuals highlights the fact that people may vary not only in the amount of self-focused attention, but also in the systematic biases that color their self-judgments. The personality dimensions N and E are linked to the experience of negative and positive emotional states, respectively (e.g., Costa & McCrae, 1980; Gross, Sutton, & Ketelaar, 1998). Because emotional states influence evaluative judgments in a mood-congruent fashion (e.g., Schwarz & Clore, 1983; for a review see Pham, 2007), one would expect that extraverted individuals would overestimate their current standing relative to their desired goals, whereas neurotic individuals would underestimate their current status. Empirical evidence provides at least partial support for this notion (e.g., Little et al., 1992; Goodwin & Engstrom, 2002; Schaefer et al., 2004).

Emotional states not only act as *biases* in self-assessment but also emerge as a *consequence* of perceived discrepancies between self-perceptions and goal states: Goal attainment elicits positive affect, whereas people who fail to live up to self- or other-imposed goal standards experience a range of negative emotions (e.g., Bandura, 1989; Higgins, 1987).

Personality traits may influence how people respond to and manage such emotions. In particular, they may determine whether individuals adopt a *hedonistic* approach that maximizes positive emotional experiences at all costs, or a *utilitarian* approach where individuals are willing to accept some negative emotions if they are perceived as useful (Tamir, Chiu, & Gross, 2007). Recent research indicates that in some situations, people high in N are more likely to take the latter approach: Before performing a demanding task, neurotic individuals deliberately choose to increase their level of worry (e.g., by recalling a worrisome event from their past; Tamir, 2005). Consistent with a utilitarian model of emotion regulation, this strategy appears to benefit their cognitive performance (Tamir, 2005, Study 4). Neuroticism is also related to *defensive pessimism*, a motivational strategy by which individuals foster unrealistically low

estimations of their abilities, in order to create anxiety which serves as an incentive to work harder (Norem & Cantor, 1986; Norem & Chang, 2002). In real life, this phenomenon is annoyingly familiar to any student who has ever witnessed a classmate fret profusely and publicly about lack of preparation for an upcoming exam only to find out afterwards that the very same student spent the whole night studying and aced the exam.

However, even among more neurotic individuals, negative emotions are not always beneficial for self-control. If students worry too much, they may convince themselves that success at the upcoming exam is impossible. To protect their self-esteem from the impending failure they may then resort to sabotaging their own success (e.g., by excessive drinking). This somewhat paradoxical strategy of actively engaging in goal-inconsistent behavior to avoid attributions of personal failure—also referred to as *self-handicapping*—is empirically related to both high N and low C (Ross, Canada, & Rausch, 2002).

*Personality traits and self-regulatory strategies.* To close gaps between their self-perceptions and who they would like to be or think they should be, people need to select, initiate, and sustain remedial strategies. Personality traits predict both the types of strategies that a person is likely to engage in as well as the success of these strategies in modifying behavioral outcomes. Although self-control strategies are partially domain-specific (modifying one's eating behavior requires a somewhat different approach than improving one's study habits), several broad themes emerge consistently.

One of them involves keeping close tabs on one's behavior. Examples are study diaries in academic settings, or daily cigarette counts among individuals ready to ditch their smoking habits. Related strategies involve managing one's time and environment in a fashion that is conducive to goal achievement. Following this approach, students may set aside specific study times each day, and recovering alcoholics may purge the last remaining cocktail glasses from their kitchen shelves. Conscientious individuals are likely to utilize, and succeed in, these types of strategies because of their high levels of order and organization. Due to their self-focused attention and more accurate self-assessments (Schaefer et al., 2004), open individuals may be more likely to employ these strategies as well. Consistent with this view, time use efficiency is associated with high C (Kelly & Johnson, 2005) and both conscientious and open students are more likely to report time management and effort regulation as preferred learning strategies (Bidjerano & Dai, 2007). However, whereas C is associated with a preference for scheduling in the context of exercise adherence, O is associated with a preference for spontaneous exercise (Courneya & Hellsten, 1998). Agreeableness predicts a preference for time and effort regulation in learning contexts as well (Bidjerano & Dai, 2007)—possibly because of its association with compliance.

Another approach to behavior modification aims to increase the salience of the affective consequences of reaching a desired goal or failing to avoid an "antigoal." This strategy is used both by dieters who tape favorite photos of themselves in skinny jeans to the fridge door, and by public health officials in many European and Asian countries who have mandated the drastic images of cancerous lungs or gangrenous legs that that now appear on cigarette packaging. The relative effectiveness of positive and negative

imagery appears to depend on the recipients' personality traits. Consistent with their respective focus on positive versus negative emotional experiences (see above), individuals high in E respond more to positive imagery, whereas individuals high in N are more likely to be swayed by threatening visions of the future (e.g., Knutson & Bhanji, 2006).

To improve their self-regulation, people may also harness the power of social relationships by seeking instrumental help or social support from others. The interpersonal aspects of E and A have a bearing on such approaches. Extraverted individuals, for example, are more likely to request help from peers in academic contexts (Bidjerano & Dai, 2007) and they prefer to exercise in group settings (Courneya & Hellsten, 1998). Both extraverted and agreeable individuals also prefer to work in cooperative settings (Ross et al., 2003).

Regardless of which self-regulation strategy is chosen, Will Rogers's old adage holds true: "Even if you're on the right track you'll get run over if you just sit there." Thus the most elaborate self-regulation strategy will fail if it is never put into practice. Among the five factor traits, low C shows the strongest association with excessive procrastination (Steel, 2007; Watson, 2001). Neurotic individuals are also more likely to procrastinate, primarily due to higher levels of impulsiveness (Steel, 2007).

## Individual Differences in Self-Regulation

Developmental, clinical, and personality psychologists have proposed a number of trait-like individual difference constructs relevant to aspects of self-regulation. Buss and Plomin (1975), for example, described an impulsivity temperament in children assessed by poor Impulse Inhibition, Sensation seeking, low Persistence, and quick Decision Time scales of the EASI-III Temperament Survey. Scales with similar names have been proposed by Eysenck, Jackson, Tellegen, Zuckerman, Cloninger, Barrett, and others. Whiteside and Lynam (2001) administered all these scales to a sample of undergraduates, along with measures of three of the FFM factors—N, E, and C—which they considered relevant to impulsivity. As they anticipated, they found four factors: Urgency, Sensation seeking, Perseverance, and Premeditation, corresponding to the four EASI-III Impulsivity scales. They also corresponded to four facet scales from the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992)—N5: Impulsiveness, E5: Excitement seeking, C5: Self-discipline, and C6: Deliberation, respectively—supporting the view that N, E, and C are the factors most relevant to impulsivity.

However, a broader view of impulse regulation can incorporate the other factors. Table 7.2 summarizes selected studies that have related measures of impulse versus constraint, broadly construed, to measures of the FFM. The first five entries report results of factor analyses; the next three are based on correlations. The last three entries are studies of three discrete personality types, defined by combinations of the five factors, and interpretively labeled (following Block & Block, 1980), as Overcontrolled,

**Table 7.2** Classification of Measures of Impulse and Constraint in Terms of the Five-Factor Model of Personality Traits

| *Measure* | *Study* | *Factor* | | | | |
|---|---|---|---|---|---|---|
| | | *N* | *E* | *O* | *A* | *C* |
| Impulsivity factors | Whiteside & Lynam (2001) | **Urgency** | Sensation seeking | | | **Premeditation; Perseverance;** Low urgency |
| EASI-III Impulsivity (Buss & Plomin, 1975) | McCrae & Costa (1985) | **Poor impulse inhibition** | Sensation seeking | | | **Slow decision time; Persistence** |
| Trait self-control (McCrae, 1976) | McCrae & Costa (1985) | **Poor inhibition of emotions, impulses;** Low patience | | | | **Low procrastination; Persistence;** Patience |
| Self-control scale | Tangney et al. (2004) | **Low self-control** | | | Self-control | **Self-control** |
| Adult temperament questionnaire | Evans & Rothbart (2007) | Low effortful control | | | | **Effortful control** |
| BIS/BAS scales (Carver & White, 1994) | Smits & Boeck (2006) | **Behavioral inhibition;** Low behavioral activation: fun-seeking | **Behavioral activation: fun-seeking,** reward responsiveness; Low behavioral inhibition | | Behavioral inhibition | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Generalized self-efficacy (Schwarzer, 1992) | Burke et al. (2006) | Low self-efficacy | Self-efficacy | Self-efficacy | | Self-efficacy |
| Locus of control (LOC; Rotter, 1966) | Costa et al., 1991 | External LOC | | | | Internal LOC |
| California Child Q-Set (CCQ; Block & Block, 1980) Types | Robins et al. (1996) | Overcontrol; Undercontrol | Low overcontrol | Low undercontrol | Low undercontrol | Low undercontrol |
| CCQ types | Asendorpf & Van Aken (1999) | Overcontrol; Undercontrol | | Low overcontrol | Low undercontrol | Low undercontrol |
| NEO-PI-R (Costa & McCrae, 1992) Types | Schnabel et al. (2002) | Overcontrol | Low overcontrol; Undercontrol | Low overcontrol; Undercontrol | | Low undercontrol |

*Note*: All correlations are significant and greater than .25. Scales with correlations or factor loadings greater than .50 are given in boldface. Type means greater than .5 *SD*s from the grand mean are reported.

Undercontrolled, and Resilient. The larger associations are given in boldface, and suggest at a glance that N and C are the most relevant factors, but all five are implicated in some conceptions of control.

The correlates of N are at first puzzling, because they include both overcontrol and undercontrol, both inhibition and impulsiveness (cf. Carver, 2005). These correspond to different ways in which individuals can be maladjusted. Overcontrol is inhibition attributable to such traits as anxiety and self-consciousness; individuals high in these traits are motivated to avoid punishing experiences and thus reluctant to act at all. Neurotic overcontrol is also seen in some kinds of compulsive behavior, where a failure to enact the compulsion is anxiety-provoking. Undercontrol is seen in impulsiveness, aptly labeled *Urgency* by Whiteside and Lynam (2001). Individuals high in this trait are prone to give in to temptations to overeat, take drugs, or spend money, chiefly because they cannot bear the distress caused by frustrated urges. What are felt as normal desires by others have the force of addictions for them. Because they feel negative affects more strongly (see above), individuals high in N are also less able to control their emotional reactions.

It is an unfortunate truth that people prone to anxiety are also prone to impulsiveness. They overeat and then worry about their health; they overspend and become depressed about their finances. Conflicted as they are, it is perhaps not surprising that individuals high in N tend to be low in generalized self-efficacy and external in locus of control. Self-regulation is altogether easier for those low in N.

Extraverts are outgoing, fun-loving, and uninhibited, and in these respects they are less constrained and controlled than are introverts. The concept of behavioral activation (e.g., Carver & White, 1994) posits that some individuals are more sensitive to rewards than others and are roused to activity by the prospect of pleasure. Introverts, low in reward sensitivity, have little incentive to introduce themselves to a stranger—they get no pleasure from chatting with people, as a NEO-PI-R item says. It is for this reason, not shyness, that they are socially inhibited. Table 7.2 includes correlations with a measure of generalized self-efficacy (not the domain-specific version Bandura advocates). Natural confidence and the social success usually attendant on an outgoing personality make extraverts higher in this generalized self-efficacy.

Aside from a small correlation with self-efficacy, O is not related to most conceptions of impulse or constraint; it appears here only as a definer of types. Even here there is some inconsistency: Robins et al. (1996) found that their undercontrolled boys were closed to experience, whereas Schnabel, Asendorpf, and Ostendorf (2002) reported that their undercontrolled subjects were open. Stylistically, the latter seems more reasonable (and consistent with the findings of Asendorpf & Van Aken, 1999): Open individuals are more adventurous, versatile, spontaneous, mischievous, and flirtatious; closed people are more cautious, mild, and conservative (Costa & McCrae, 1992).

Whiteside and Lynam (2001) did not include measures of A in their study of impulsivity, but Table 7.2 shows that there is some evidence that agreeable people are more controlled and inhibited. Much of socialization consists of inculcating agreeable behavior: courtesy, thoughtfulness, control of aggression. Agreeable people more readily

internalize these rules of social control. Antagonistic people, by contrast, have less incentive to control their behavior because they do not share prosocial goals. In consequence, they are more likely to exhibit antisocial behavior, from aggressive driving to drug use (Brooner, Schmidt, & Herbst, 2002).

Finally, there are strong associations between C and a number of measures of constraint. Of most importance are the two aspects called Premeditation and Perseverance by Whiteside and Lynam, and C6: Deliberation and C5: Self-discipline by Costa and McCrae. The first refers to the tendency to interpose thought between the impulse to act and the action, so that unwise choices can be avoided. The second refers to the ability to force oneself to act consistently with one's higher interests. Individuals high in C are able to set to work without procrastinating and to persist in tasks, even when they are aversive. They also can inhibit behavior, as in delaying gratification or suppressing it altogether. These two functions of self-discipline were recognized in the ancient Stoic motto "Bear and forbear."

If C5: Self-discipline appears to be the trait central to classic notions of willpower, C6: Deliberation seems on its surface to be more a matter of cognitive style. Stopping to think does not seem to be a difficult challenge requiring great strength of character; it needs only a habitual prudence. A reasonable hypothesis, then, would be that deliberation (which loads on the same factor as Eysenck's and Barrett's Impulsivity scales) should be related to cognitive measures of impulsivity, such as accuracy in the Stroop Color Word Test. In that test, respondents are shown color names, sometimes printed in the matching color, and sometimes printed in a mismatched color; when asked to read the word, impulsive people sometimes blurt out the seen color instead. Adult patients with attention-deficit hyperactivity disorder (ADHD; Schweiger, Abramovitch, Doniger, & Simon, 2007) perform poorly on the Stroop test, and they are decidedly low in C (Nigg et al., 2002). However, studies in nonclinical samples generally fail to find any association between measures of deliberation and Stroop performance (e.g., Jensen-Campbell et al., 2002; Kirkeby & Robinson, 2005). Similarly, Costa and McCrae (1998) found no relation between C6: Deliberation and choice reaction time in a large adult sample. There is a great need for systematic studies on the relations between personality traits, assessed at the facet level, and cognitive and neuropsychological measures of impulsivity and executive function, but at present it appears that deliberation is best understood as a personality dimension rather than the outcome of characteristic cognitive processes. It is perhaps the combination of low deliberation and cognitive impulsivity that leads to the impairments of ADHD.

Costa and Piedmont (2003) described personality styles defined by pairs of the five factors. Of most relevance here is the style of impulse control, defined by levels of N and C. Individuals low in N and high in C are labeled *Directed*, and are said to have "a clear sense of their own goals and the ability to work toward them even under unfavorable conditions." Those low in N and low in C are *Relaxed*, and "see little need to exert rigorous control over their behavior." The combination of high N and high C yields an *Overcontrolled* style predisposing to obsessive and compulsive behavior. High N and low C together define an *Undercontrolled* style, in which people are "often

at the mercy of their own impulses" (Costa & Piedmont, 2003, p. 273) and are at risk for substance abuse and other health risks (Terracciano & Costa, 2004).

This set of styles draws on the fact that the strength of urges is a function of N, and the ability to control urges is a function of C; behavior is thus a joint function of the two factors. Such thinking was anticipated by many centuries in Aristotle's *Nicomachean Ethics*; there he distinguished *temperance*, a lack of excessive urges, from *self-control*, the successful mastery of strong urges. Temperance corresponds to the relaxed and directed styles, self-control to the overcontrolled style. That style appears to be undesirable in Costa and Piedmont's description, and Aristotle would doubtless concur if self-control departs too far from the golden mean.

## Conscientiousness and Techniques of Self-Control

We have discussed two facets of C that are directly relevant to self-control, but the NEO-PI-R assesses six facets, and the remaining four facets may also contribute to trait self-control. C1: Competence reflects the degree to which individuals are efficient, effective, and prepared; it is the facet of C most strongly correlated with self-esteem and internal locus of control. C2: Order assesses neatness and organization and a preference for structure in life. C3: Dutifulness measures the tendency to be governed by rules of conduct, to adhere strictly to one's principles; and C4: Achievement striving assesses the need to set lofty goals and work to accomplish them. All these traits can facilitate self-control.

Why exactly do people high in C excel in self-control? This question seeks a process explanation for a trait effect, and McCrae (1976) argued that several distinct processes, or techniques, could be invoked to subordinate impulses to higher interests. *Balance of interest* is a matter of weighing the attraction of the momentary interest against the value of competing, often long-range goals. This might be considered the economist's perspective on self-control; it presumes that choices are made on the basis of the valence and probability of alternative outcomes, and the weighing of interests may well be the same for individuals low and high in C. These groups differ, however, in the structure of their life goals. High C individuals set high standards for themselves and make detailed life plans; their personal projects are more meaningful and important to them (Little et al., 1992). In consequence, for them the balance of interest more easily tips away from momentary impulses toward their clearly articulated and cherished plans and goals.

*Commitment* as a technique for self-control is seen in the familiar practice of making resolutions. Private and especially public commitments to a course of action can shift the balance of interest by adding the incentive of pride in success or shame in failure—what Schulz and Heckhausen (1996) would regard as *selective secondary control*, or modifying the self to gain control over the environment. High C individuals are more likely to use this device as a way of reaching their goals of self-improvement—goals

which individuals low in C3: Dutifulness and C4: Achievement striving generally lack. A celebrated instance is recounted in Benjamin Franklin's *Autobiography*, in which he described his resolution to "live without committing any fault at any time; I would conquer all that either natural inclination, custom, or company might lead me into." Several of the virtues he cultivated, such as temperance, industry, and moderation, are themselves forms of self-control, so his project involved self-regulation of self-control. He maintained his resolve by keeping a daily record of his progress, continually renewing his commitment. Although he fell short of perfection, at the end of his life he believed he was "a better and happier man than I otherwise should have been if I had not attempted it."

*Control of attention* refers to the fact that the weighing of interests depends upon which interests are called to mind. Distraction from thoughts of a present temptation, or attention to the long-term benefits of abstaining, both make the wise choice easier. But one can consider future benefits only if one pauses to think before acting, and this is characteristic of people high in C6: Deliberation.

The techniques discussed so far resolve conflicts between impulses and higher interests on a case-by-case basis. As Franklin discovered, *habits of control*, developed and maintained over long periods of time, are more reliable and efficient. If one starts every morning by jogging five miles, exercising becomes more a routine behavior than an act of self-discipline. And just as one can program oneself to do what one should, one can also structure the environment to facilitate self-control. Setting aside a quiet location for studying can make it easier to get to work; keeping the liquor in a locked cabinet limits the temptation for a quick nip (cf. Wansink, Painter, & Lee, 2006). But keeping regular schedules and maintaining an orderly environment come naturally only to people high in C1: Competence and C2: Order; they are temperamentally better equipped to cultivate habits of control.

Another long-term solution to conflicts of self-control is extirpation of the impulse itself, that is, *control of drives*. This can sometimes be accomplished by oversatiation, a technique used in smoking cessation programs in which smokers are required to smoke one cigarette after another to the point of nausea. After the first cigarette, there is little attraction for the next; after the last cigarette, the thought of another is aversive. Simple abstinence, if relapses are scrupulously avoided, will eventually eliminate cravings for cigarettes or addictive drugs. (Unfortunately, this is not an option for dieters.) There are long traditions in Eastern and Western religions that seek permanently to overcome the attractions of the flesh through asceticism. In all these techniques, effortful control is needed for a period of time in order eventually to make the effort unnecessary, but the initial control will always be easier for those high in C.

McCrae (1976) offered one final technique, which seems designed expressly for those low in C: *self-imposed constraint*. In this scenario, the individual arranges for others to enforce his or her decisions, perhaps by entering a treatment program, or by asking a friend to hide the cigarettes. The classic instance of self-imposed constraint concerns Odysseus, who had himself tied to the mast so that he could listen to the Sirens without succumbing to their lure. From his long-suffering endurance and persistence

we can infer that Odysseus was high in C—but the Siren song was magic, and he rightly judged that he would need more than his own efforts to prevail. This is *compensatory primary control* (Schulz & Heckhausen, 1996), gaining control over one's actions through external assistance.

In an impressive series of studies over the past decade, Baumeister and colleagues have advanced the idea that efforts of self-control and, more broadly, self-regulation, tax a limited resource. For example, trying to regulate emotional responses to unpleasant stimuli decreased subsequent physical stamina (Muraven, Tice, & Baumeister, 1998). Because almost all deliberate activity—except perhaps play—can be regarded as requiring some effort, the chronic energy level of the individual may have an important role in how well life is organized (cf. Gailliot et al., 2007). In the NEO-PI-R, energy level is assessed as a facet of E, Activity, but this facet has a robust secondary loading on C (McCrae et al., 2005a). Thus high C individuals may excel in self-control because they are endowed with higher levels of the resource needed to make an effort.

Elsewhere, these authors have suggested that ego depletion (as they call the loss of volitional energy) can be limited by relying on habit and routine to replace taxing choices (Baumeister, Muraven, & Tice, 2000). William James had noted that:

> there is no more miserable human being than one in whom nothing is habitual but indecision, and for whom the lighting of every cigar, the drinking of every cup, the time of rising and going to bed every day and the beginning of every bit of work, are subjects of express volitional deliberation. (James 1892/1962, p. 160)

The methodical and organized life of high C individuals thus allows them to conserve their willpower for use in more challenging situations; those low in C fritter it away on mundane choices.

Finally, Muraven, Baumeister, and Tice (1999) have offered evidence that exercising self-control on a regular basis can strengthen it. This surely is the premise behind the drills and discipline that have been part of military life since ancient times. It might seem at first that conscientious people would be at a disadvantage here, because they avoid the use of deliberate self-control though the acquisition of good habits, and thus might seem to exercise it less. But high C people push themselves to accomplish more, and these purposeful efforts, which are likely often rewarded by success, are probably more efficacious in developing or maintaining high levels of volitional strength than the merely tiring efforts that disorganized people must make to deal with daily hassles.

## Implications of Trait Psychology for Self-Control and Its Failures

There is a growing literature showing that measures of trait self-control (or perceived self-regulatory efficacy; Williams & Coombs, 1996) are in fact important predictors

of success or failure in efforts at self-control (e.g., Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Marcus, 2003; McCrae, 1976; O'Gorman & Baxter, 2002; Schmeichel & Zell, 2007), and Table 7.1 makes it clear that these measures are interpretable as aspects of the FFM. In consequence, the whole body of research on the FFM can be applied to the study of self-regulation. The results are both informative and sobering to those involved in treating failures of self-control.

It is well established from adoption and twin studies that all five FFM factors are substantially influenced by genetics, but are essentially unrelated to the shared environment—that is, the experiences that children share by virtue of living in the same family and neighborhood, having the same parents, eating the same food (Bouchard & Loehlin, 2001). Thus giving children a "good upbringing" or "building character" by consistent discipline may provide the optimal environment while the child is growing up, and it may influence specific lifelong behaviors, but it is unlikely to have much impact on the child's personality traits as an adult. This is a startling conclusion, flying in the face of centuries of traditional wisdom and most accounts of personality functioning. As recently as 1981, Mischel could write, "Genes and glands are obviously important, but social learning also has a dramatic role. Imagine the enormous differences that would be found in the personalities of twins with identical genetic endowments if they were raised apart in two different families" (cited in Tellegen et al., 1988, p. 311). We now know that those aspects of personality that are styled "characteristic adaptations" in Figure 7.1 might be quite different, but that basic tendencies, including trait self-control, would probably not be.

Anthropologist April Leininger (2002) provided a striking example of this phenomenon. She interviewed Vietnamese Americans and also administered a measure of the FFM. As a group (cf. McCrae et al., 2005b), Vietnamese Americans are characterized by high academic and occupational achievement, but her sample scored slightly below American norms on measures of C, and in particular Achievement striving. After six months of participant observation, Leininger concluded that these low C scores were accurate: Vietnamese Americans as a group were diligent students not because they felt any intrinsic drive to excel, but because their families placed extraordinary value on academic success and they were intensely loyal to their families. As a result, their self-disciplined behavior in academic areas did not generalize to other areas of life, such as athletic pursuits or health consciousness.

It is well established that individual differences in personality are quite stable in adulthood, with 10-year retest correlations around .80 (Terracciano, Costa, & McCrae, 2006). By implication, most people do not change their standing on trait self-control even over long periods of time in the normal course of events. But Muraven and colleagues (1999) found a short-term effect of deliberate practice of self-control, and Benjamin Franklin claimed a long-term benefit from his self-improvement program. Harter, Tice, and Wallace (2004), drawing on laboratory studies, asserted that "persistence is one human strength that can certainly be improved" (p. 245), although they also acknowledged that laboratory studies may not generalize to the real world. Interventions to increase self-control may be worth trying, but they are probably most

likely to be effective in those already high in self-control. Anyone familiar with the natural history of smoking, drinking, obesity, or drug use knows that chronic relapse is the rule rather than the exception.

There is, however, one ray of hope from the FFM literature, having to do with the developmental course of personality traits. From adolescence on, N tends to decrease and C to increase, albeit at a very gradual pace (Terracciano, McCrae, Brant, & Costa, 2005). Problems with self-control ought therefore to decrease with age, and in fact they do. The prevalence of smoking declines with age after early adulthood, and borderline personality disorder, characterized in part by impulsivity (gambling, binge eating, substance abuse, reckless driving, and self-mutilation), declines notably from early to middle adulthood (American Psychiatric Association, 1994).

### *The Role of Traits in Treatment*

It is precisely because of the difficulty of modifying traits that psychologists have generally focused on process models of impulsivity and self-regulation: They seem to offer more promise for interventions than do trait models. But most techniques of self-control are most easily implemented by those already high in trait self-control, and there appear to be limitations to the effectiveness of many interventions. Consistent with a fixed resource model, Muraven and Shmueli (2006) showed that fighting the temptation to drink can impair self-control on subsequent tasks. Smokers who quit often turn to overeating. Books on dieting, exercise, and general self-improvement are frequently bestsellers, but America has not become slim and trim. The "war on drugs," prosecuted vigorously since 1971, has dramatically increased the prison population of the US, but has not reduced the consumption of drugs. Borderline personality disorder is notoriously difficult to manage. The conclusion to be drawn from these observations is not that efforts to improve self-regulation are futile, but rather that they are likely to be difficult, and expectations should be correspondingly modest.

Interventions to enhance self-control take place in various contexts: in medical consultations, in classes, and in one-on-one counseling sessions. Individual sessions function much like psychotherapy, and can benefit from personality assessment in the same ways (Singer, 2005). The counselor who understands the client's personality profile can be more empathic and more easily develop rapport. Assessing the full FFM will show the client's strengths as well as weaknesses, and may allow the counselor to tailor interventions. For example, Herman, Roth, and Polivy (2003) have reported that people generally try to eat less than their companions in social situations. It would be sensible to create a luncheon club for dieting extraverts, who would all benefit from the example of mutual restraint. But such a club would have less appeal to introverts, who might prefer other, private dieting techniques. An exercise program designed for an individual very closed to experience should stress routine; one for an open individual would need variety to maintain interest.

The client's standing on N and C would be of particular importance. Most people who are in need of intervention for some kind of self-control will be high on N or low on C or both, but there are still variations in degree. The client who is very high on N (like a borderline personality disorder patient) might need pharmacological treatment to lower urgency to a manageable degree. Clients who are very low on C cannot be counted on to do much for themselves; to the extent possible, treatment should rely on external constraints and the assistance of friends or family members. These are the kinds of interventions that should probably be reserved for the most serious cases, such as the smoker who has developed coronary disease or the compulsive gambler who is facing bankruptcy.

Failures of self-control are often the focus of public health programs. Public policy obviously cannot be guided by the personality profiles of individuals, but it should be informed by what we know about personality and self-regulation. The "Just say no" campaign became a national joke because it so grossly overestimated the willpower of drug users. Forty years ago an antismoking campaign that relied on health warnings could have an impact, because some smokers were high in C and could change their behavior once they fully understood the risks. Today, the remnant of smokers are probably too low in C to stop smoking no matter how dire the warnings. The increasing restriction of places in which smoking is permitted, and the zeal with which these prohibitions are enforced by nonsmokers, may be the most effective deterrents to smoking at the present time.

## Conclusion

A realistic assessment of the possibilities of improving self-control always seems pessimistic to those engaged in the effort. So it is perhaps useful to consider how successful efforts at self-control already are. The great majority of people get up and go to work, not because they love their jobs, but because they need them. Most people do not use drugs, and use alcohol in moderation. Episodes of road rage still make headlines, because most of us control our tempers. Civilization itself depends on the reliable operation of self-regulation in citizens filling thousands of roles. All this self-control is possible because people already know and use many techniques of self-control—avoiding temptations, making resolutions, developing good habits—and because, except for a tiny group of severely impaired individuals, people all have at least a modicum of trait self-control that makes self-regulation possible. Evolution has seen to that.

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# 8

# *Self-Determination Theory and the Relation of Autonomy to Self-Regulatory Processes and Personality Development*

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The struggle for freedom has been a dominant political theme throughout history. Repeatedly, repressive regimes have gained control over countries, eventually to be challenged by one or more rebellious individuals who topple the tyranny and proclaim freedom. Evidence of such conflicts can be found in the Greek war cry, "Freedom or death," a sentiment echoed by Patrick Henry's famous demand, "Give me liberty or give me death." In more recent times this struggle has been reflected in the actions of such people as Archbishop Desmond Tutu and the 14th Dalai Lama of Tibet, who worked to promote their people's voices and self-governance.

Through the millennia and across cultures an analogous struggle for self-governance has also played out at the psychological level of individuals during development. Born with an inherent tendency toward self-organization and growth, individuals struggle to act with volition and integrity amid social forces that can make them feel controlled like pawns or helpless (de Charms, 1968; Deci & Ryan, 1985b). At this individual level of analysis, it is not tyrannical political systems, but rather more proximal interpersonal forces in the everyday contexts of people's lives, which represent the primary sources of control. That is, the salient controls for most people stem from external pressures, rewards, or contingent approval of peers, parents, teachers, managers, and other significant people. This personal struggle between the experience of autonomy and its impingement by control represents a backdrop for every human life.

Regarding conflicts over freedom at the historical, sociopolitical, and economic levels, many thinkers have stressed the importance of freedom and self-governance as a component of healthy development and successful societies (e.g., Sen, 1999). Yet whereas political and economic freedom has many champions, within the discipline of psychology the importance of autonomy has had few proponents. Various mainstream

theories have in fact maintained that autonomy is not a useful or meaningful concept (e.g., Bandura, 1989); is simply a reflection of not having not identified the true, external determinants of behavior (e.g., Skinner, 1971); is primarily a Western, male value (Markus & Kitayama, 1991); or is an illusion (e.g., Wegner, 2002; Wilson, 2002). In contrast, *self-determination theory* (SDT; Deci & Ryan, 1985b, 2000; Ryan & Deci, 2000b) has maintained that the struggle between the need for volition and choice and the forces of both external and internal chaos and control is a deep and central agenda in human development that has important implications for motivation, behavior, and wellness. Within SDT, autonomy concerns people's inherent inclination toward integration and synthesis. As individuals develop the capacity to self-regulate and to integrate values to guide behavior, they experience greater autonomy. As such, the concept of autonomy is necessary for understanding how healthy personality development occurs and how individuals can be flexible and self-regulating as they encounter the ever-changing challenges of life. In this chapter we apply the principles of SDT to an understanding of the processes involved in self-regulation and personality development.

To elucidate these ideas, this chapter examines three main themes. First, we briefly discuss how autonomy has been defined by various philosophical traditions (for a more complete review, see Ryan & Deci, 2004, 2006). Second, we review both historical and contemporary ideas on the concepts of will and autonomy within psychology. Third, we discuss the metatheoretical and theoretical postulates of SDT and review and synthesize empirical findings from within this tradition on the role of autonomy in healthy self-regulation and personality development.

## Philosophical Perspectives on Autonomy

The concept of autonomy is central to SDT. To be autonomous means to be self-governing and to act with the experience of volition. When acting autonomously, one stands behind or endorses one's actions. In contrast, a lack of autonomy is reflected in the experience of being controlled to behave in certain ways. Various theoretical traditions within philosophy, including phenomenology, existentialism, and analytic philosophy, have addressed autonomy or closely related concepts. We briefly consider these traditions.

### *The Phenomenological Perspective*

Phenomenology addresses the study of autonomy in terms of how it appears within the experience of a person. Early in the phenomenological movement begun by Husserl, Pfander (1908/1967) highlighted the salience of autonomy within people's experience.

He argued that autonomous actions are those that are felt to emanate from, or to be supported by, the self. In Pfander's analysis autonomy need not entail an absence of external influence or impetus to act. Rather, the issue of autonomy concerns the degree to which the person endorses the actions that follow from such influences. Similarly, Ricoeur (1966) considered autonomous actions to be those that are fully endorsed. In his view, independence from external influences is not necessary for the experience of autonomy; rather, autonomy requires that people truly assent to and value the actions they take following initiating events.

### *The Existential Perspective*

Kierkegaard (1843/1985) suggested that the self represents a continually active, synthetic process through which people can continually reevaluate themselves, so as to ensure that their actions are aligned with their deeply held values and beliefs. People are said to be *authentic* to the extent that they are willing to take responsibility for their own actions and to integrate them with their abiding values. When a person fails to live authentically, the person is said to exist in a state of "bad faith" (Sartre, 1956). Within psychology, the issue of authenticity was recently taken up by Kernis and Goldman (2005), who associated authenticity with autonomy and demonstrated empirically that authentic living is experienced as autonomous and is conducive to psychological health. Similarly, Ryan and Deci (2004) argued that the meaning of authenticity, both in the sense of authoring one's actions and of representing something genuine, is aligned with the construct of autonomy, which pertains to truly volitional and integrated actions.

### *The Analytic Perspective*

Over the past four decades, the concept of autonomy has been an important element of the modern analytic tradition of philosophy that began with Frankfurt (1971) and includes the work of Dworkin (1988) and, more recently, Friedman (2003) and Taylor (2005). Applying a hierarchical conception, these authors state that autonomy requires that one's actions be reflectively endorsed, as such behaviors are those that can be (more or less) wholeheartedly enacted and are most supported by reason, "all things considered." Applying this perspective, Friedman (2003) specifically asserted the importance of autonomy for women and detailed how the value for autonomy is compatible with valuing relatedness. In her perspective, the capacity to reflectively evaluate and choose one's actions is not only unopposed to relatedness; she submits that it is indeed through one's volition or autonomous action that one may help nurture and develop relationships and connections with others.

### *A Brief Summary*

Three important tenets of autonomy can be drawn from these philosophical traditions. First, autonomy concerns the self-endorsement of one's actions. This endorsement may not always be explicit, but it can be affirmed through a reflective process by which people examine their behaviors to ensure that they are congruent with their beliefs and values. Second, to be autonomous people do not have to act independently of external prompts, pressures, or influences. Indeed, external factors often lay the groundwork for motivated behavior, both autonomous and controlled. Third, autonomy involves people's full and deep commitment to continually reevaluating their behaviors to ensure that they are autonomous. When people follow societal mandates that are antithetical to their values, it is within their capacity to realign their behaviors with their beliefs to act with authenticity and autonomy.

## The Concept of Will in Psychology: Historical and Contemporary Considerations

### *Historical Considerations*

The concept of *will* has long been a topic of discussion in philosophy and psychology. Rightly, psychologists have argued against the concept of free will, pointing out that free will implies a lack of lawfulness or causality in behavior (Ryan & Deci, 2006). However, Sperry (1976) argued that the concept of "will," as opposed to "free will," simply means that people's choices can have a causal relation to their behavior. Thus, rather than adopting a unidirectional relation from neurological to psychological processes, Sperry accepted a bidirectional relation suggesting that psychological processes (viz., will) can also influence neurological processes. In fact, a look at the historical theories of will within psychology suggests that, in fact, this is how "will" has been interpreted.

James (1890) suggested that all voluntary behavior is willed, describing it in terms of people's thinking about a future attainable outcome and having the behaviors necessary to obtain that outcome occur automatically. However, when obstacles arise, the person must make a deliberate decision to act despite the barrier, which James referred to as *fiat*. Thus, for James, there was room for intentionality and volition within automatic processing.

Lewin (1951) formulated his theory of will during the time of the "cognitive revolution," positing that when physiological drives become operative, people formulate goals to satisfy these urges. At times, however, barriers may arise that stand in the way of moving toward the desired goal and achieving equifinality. For Lewin, the concept of will comprises the extra energy needed to overcome the impasses that obstruct goal-directed behavior.

Although Erikson (1950, 1968) used the term autonomy, rather than will, he developed his concept from a psychosocial developmental perspective, suggesting that

children form a rudimentary sense of autonomy around the ages of 2 or 3 years, during which time they begin to view themselves as separate from the environment and, accordingly, capable of exercising autonomy. Denial of the experience of free choice or feeling overexposure and self-consciousness in exercising autonomy are likely to leave children with the experience of doubt, which may lead to the development of overly rigid or defiant behaviors later in life. Thus, for Erikson, it was important that children feel a sense of trust in exercising autonomy, which allows for healthy identity formation and the courage to choose and guide one's own future.

Piaget (1967) discussed the concept of will from a cognitive developmental perspective. He proposed that the will becomes operative during middle childhood, around the ages of 8 or 9 years, a time during which children are very involved with their peers. At this time, children encounter conflicts between their biological drives, which Piaget considered to be morally inferior, and their thoughts concerning appropriate behavior, which Piaget considered to be morally superior. For Piaget, will was what allowed children to behave in accord with their morally superior thoughts, rather than their morally inferior urges.

### *Contemporary Considerations*

Despite the seemingly important status of the concepts of autonomy and will among prominent historical figures in psychology, some classic and contemporary theorists have relegated the concepts and maintain that volition (i.e., autonomy) and will are neither meaningful nor universally important, or even suggest that autonomy is merely an illusion. We shall briefly outline these arguments to allow for a broad understanding of how autonomy is conceptualized within current psychological theory (for a more complete review, see Ryan & Deci, 2004, 2006).

Operant psychology (Skinner, 1971) emphasized that control over action resides in the contingencies of reinforcement in the environment and that autonomy was simply an attribution made when the true causes of a behavior cannot be identified. Evolving from these behaviorist roots, social-cognitive theories (e.g., Bandura, 1989) have interpreted autonomy (or will) as independence from all external influences on behavior. Because the environment undeniably has an effect on people's behavior, the concept of autonomy was thus rejected and motivation was reduced to beliefs about control over reinforcements and feelings of efficacy about obtaining those end states. As such, like operant theory, social-cognitive theories defined autonomy as independence from an environment, a definition that *a priori* renders it meaningless.

More recently, neuroscientists and other psychologists have claimed that the concept of autonomy is an illusion. For example, Pinker (2002) suggested that because the brain has the capacity for executive control to prompt behavior and override automatic responses, "the rational free agent traditionally identified with . . . the self" (p. 43) is a myth. Instead, Pinker argues that it is the *brain* that controls the actions of the person, not the *self*. Some social psychologists interested in nonconscious

processes (e.g., Wegner, 2002; Wilson, 2002) have argued that because, at times, behaviors arise from causes of which individuals are unaware, the notion of a conscious will is illusory. However, their formulation of will in terms of conscious decision making about behavior fails to speak to the more important issues of endorsement and volition in behaving, which, repeatedly, have been linked empirically to effective performance and psychological well-being (e.g., Deci, & Ryan, 2000; Ryan & Deci, 2000b).

Finally, some cultural relativists (e.g., Markus & Kitayama, 1991) have argued that autonomy, which they defined as individualism and independence, is relevant to behavior and psychological health primarily among Western individuals because these values are prominent in Western societies, but not in Eastern societies that tend to focus on communal and interdependent living. Iyengar and DeVoe (2003), who also defined autonomy as individualism and independence, argued that autonomy does not contribute to psychological health among Easterners. Similarly, feminists such as Jordan (1997) have argued that autonomy is primarily a male concept that contributes little, if any, to the psychological health of women, and Stephens, Markus, and Townsend (2007) have maintained that choice and agency are important for middle-class Americans, but have little relevance to the lives of the working class. In short, these theorists combine to suggest that autonomy is not important to Asians, women, and the impoverished classes. In contrast, as we will argue, we believe that autonomy is critical for these groups, as well as for all humans.

### *A Brief Summary*

This review of the conceptualization of autonomy within psychology makes clear several points. First, although in some traditions autonomy and volition have been considered important to healthy human functioning, a number of prominent voices—both in the past and in contemporary psychology—deny the existence and functional importance of autonomy or will. Second, those who deny the centrality of autonomy in human experience differ in their definition of the concept, with definitions varying from a complete independence from the environment to illusions about causal mechanisms. Thus the importance of providing a coherent and exacting definition of autonomy as the experience of volition and self-organization cannot be overstated, for this definition has allowed an empirical examination of autonomy. We turn now to SDT, which has examined the relation of autonomy to self-regulatory processes and personality development.

## Self-Determination Theory: Metatheoretical Assumptions and Basic Psychological Needs

The starting point for SDT, which is also the point of divergence from many other psychological theories, is its organismic-dialectic metatheory.

### *The Organismic-Dialectic Metatheory*

SDT assumes that humans are, by nature, active organisms who are oriented toward developing and refining their capabilities by interacting with the physical and social environment; seeking out opportunities for choice, mastery, and interpersonal connection; and integrating their ongoing experiences. Yet at the same time they remain vulnerable to control and passivity and may come to rely primarily on external influences for direction when conditions are not supportive of their innate tendencies toward growth. The importance of this metatheory is that, by proposing an active organism that is vulnerable to control, SDT asserts that behavior may emanate either from people's sense of self—that is, from their interests and values—or from sources external to their sense of self, such as social mandates that are perceived as pressuring. As such, this distinction lays the groundwork for an empirical examination of the causes and consequences of behaviors that emanate from one's self or from heteronomous forces acting on the self.

Within this perspective we propose that physiological drives, psychological needs, and emotions supply the energy for motivated behavior and can work in either a complementary or an antagonistic manner. People's motivation can involve the experience of choice and volitional self-regulation or can be controlled. As well, people can fall into a state of amotivation. These points, which concern the energization and direction of behavior, contrast with other theories that fail to posit innate energy sources for behavior and instead focus only on the direction of behavior.

Finally, SDT proposes that humans tend toward psychological coherence and adaptation to their environment, a synthetic process that is conducive to development. However, under specific social conditions, persons may also experience psychological fragmentation, disharmony, and alienation, and engage in maladaptive behaviors. Thus humans are oriented toward integration at the psychological (i.e., autonomy) and interpersonal (i.e., homonomy) levels (Angyal, 1965), yet are also vulnerable to falling into psychological ill-being and discord.

### *Basic Psychological Needs*

Within SDT the concept of basic psychological needs is a unifying principle, although our definition of a need differs dramatically from that used in several other psychological traditions. Specifically, whereas some uses of the construct of need pertain to individual differences in desires or motives, SDT focuses on the concept of need as a necessary nutriment for integrated functioning.

Historically, the most prominent usage of the concept of psychological needs was offered by Murray (1938), who defined them as individual differences in desires or preferences that are learned over time and that motivate behavior across situations. Murray's definition of a need thus applies to virtually any motive or desire, without consideration of whether the behaviors that follow are salubrious or detrimental to

the person. Accordingly, Murray's list of needs includes both viscerogenic needs (e.g., air, water, food, sex) and psychogenic needs (e.g., abasement, acquisition, aggression, recognition). Many of these "needs" might facilitate health (e.g., the need for affiliation; see McAdams, 1989), whereas others might be associated with ill-health or inner conflicts (e.g., Murray's need for abasement). Still others (e.g., Murray's need for acquisitiveness) might become more salient following experiences in unsupportive environments (e.g., T. Kasser, Ryan, Zax, & Sameroff, 1995; Ryan, 2005).

By contrast, within SDT, psychological needs are defined as those nutriments that support the inherent organismic tendencies toward psychological growth and adaptation. That is, "needs specify *innate psychological nutriments that are essential for ongoing psychological growth, integrity, and well-being*" (Deci & Ryan, 2000, p. 229, italics in the original). This definition of a need as a basic nutriment for psychological health is akin to the idea that plants need certain key nutrients (i.e., sun, soil, water) to grow (Ryan, 1995). This concept of needs is amenable to empirical test, as the notion suggests that conditions that support needs will enhance growth and integrity, whereas need deprivation will have deleterious effects. Thus *basic needs theory* (Ryan & Deci, 2002), a subtheory within SDT, suggests that basic psychological needs, when satisfied, contribute independently to psychological well-being, the quality of interpersonal relationships, effective performance, and physical health, and when thwarted yield negative consequences. Moreover, SDT defines a basic need as universal, that is, as having cross-cultural significance. This means that, regardless of ambient values, satisfaction of basic needs should be associated with greater integrity and wellness.

For the past 35 years researchers within the SDT tradition have identified three basic psychological needs, namely autonomy, competence, and relatedness, each of which represents a distinct foundation for wellness (see Deci & Ryan, 1985b, 2000; Deci & Vansteenkiste, 2004; Ryan & Deci, 2000b). Notably, although we are open to the possibility of there being other basic needs, we have found little evidence to support the inclusion of others (Ryan & Deci, 2000c). The *need for autonomy* (de Charms, 1968) refers to the experience that behavior is owned, enacted choicefully, and reflectively self-endorsed. People are said to be autonomous when they perceive their behavior to emanate from the self and behave in ways that are congruent with their abiding interests, values, and beliefs. Importantly, the opposite of autonomy is not dependence, but rather heteronomy, or the experience of feeling controlled or pressured to think, feel, or behave in certain ways (e.g., Ryan & Deci, 2006). The *need for competence* (White, 1959) refers to the experience of effective interactions with the environment. Competence can be supported or enhanced by conditions that provide people opportunities to test and expand their capabilities (e.g., optimal challenges), and can be diminished by conditions that signify a lack of control over, or an inability to obtain, desired outcomes. Finally, the *need for relatedness* (Baumeister & Leary, 1995; Ryan, 1995) refers to the experience of close, deep connections with important others. The opposite of relatedness is isolation and disconnection. Relatedness experiences are associated with a willingness to trust and rely on others (e.g., Ryan,

La Guardia, Solky-Butzel, Chirkov, & Kim, 2005), or, in the case of dependents, to care for them.

The specification of psychological needs as the nutriments required for wellness has been empirically examined across a wide variety of domains and age groups. For example, a survey of recent findings suggests that satisfaction of the basic psychological needs is positively associated with psychological well-being and physical health, as well as performance, in such domains as the workplace (e.g., Baard, Deci, & Ryan, 2004; Vansteenkiste et al., 2007), athletics (e.g., Ntoumanis, 2005; Pelletier, Fortier, Vallerand, & Brière, 2001), education (e.g., Black & Deci, 2000; for a review, see Niemiec & Ryan, 2009), parenting (e.g., Assor, Roth, & Deci, 2004; Niemiec et al., 2006), prosocial behavior (Gagné, 2003), relationships (Deci, La Guardia, Moller, Scheiner, & Ryan, 2006; Patrick, Knee, Canevello, & Lonsbary, 2007), and health care (e.g., Williams et al., 2006), among others. Furthermore, the importance of psychological needs for mental and physical health has been demonstrated across the life span, from early childhood (e.g., Deci, Driver, Hotchkiss, Robbins, & Wilson, 1993) to adolescence (e.g., Niemiec et al., 2006) to old age (e.g., V. Kasser & Ryan, 1999).

Recently, studies examining within-person variations in psychological need satisfaction have shown that the three needs contribute independently to daily fluctuations in psychological well-being (e.g., Reis, Sheldon, Gable, Roscoe, & Ryan, 2000) and to variations in security of attachment (La Guardia, Ryan, Couchman, & Deci, 2000). Furthermore, and counter to the cultural relativist position (e.g., Markus & Kitayama, 1991), evidence supporting SDT's assertion that needs are universal necessities for wellness has been obtained in both Western and Eastern cultures, including Bulgaria (Deci et al., 2001), Russia (Chirkov & Ryan, 2001), Canada and Brazil (Chirkov, Ryan, & Willness, 2005), South Korea (Ryan et al., 2005), and China (Vansteenkiste, Lens, Soenens, & Luyckx, 2006), among others. As well, findings contrary to the implications of work by Stephens et al. (2007) indicated that satisfaction of the need for autonomy promoted healthy behavior among a population that consisted primarily of poor and working-class Americans (Williams et al., 2006). Finally, satisfaction of the basic psychological needs has been found to be equally beneficial for the psychological well-being and physical health of both men and women (e.g., Ryan et al., 2005).

With an understanding of the nature and functional importance of psychological need satisfaction, we turn to a discussion of the relation of psychological needs—in particular, autonomy—to self-regulatory processes and personality development.

## Self-Determination Theory: The Relation of Autonomy to Self-Regulatory Processes

SDT began with early empirical studies that investigated such factors as extrinsic rewards and positive feedback that either enhanced or undermined intrinsic motivation (Deci, 1971). It then turned to an empirical investigation of various types of extrinsic

motivation that result from differing degrees of internalization. We briefly discuss each area of research in turn.

### *Intrinsic Motivation*

The concept of intrinsic motivation was discussed by Deci (1975) when referring to behaviors that occur spontaneously (e.g., exploration, play), even in the absence of contingent rewards, punishments, or other forms of external impetus. Phenomenologically, intrinsically motivated behaviors are undertaken because they are inherently interesting or enjoyable (Ryan & Deci, 2000a). From the perspective of attribution theory, such behaviors have an *internal perceived locus of causality* (de Charms, 1968; Ryan & Connell, 1989), which means that the actor perceives the behavior as originating from his or her self, rather than as a result of external pressures or inducements. Affectively, intrinsic motivation is accompanied by the experiences of interest and excitement (Izard, 1977), and sometimes—although not always—"flow" (Csikszentmihalyi, 1975).

Intrinsic motivation plays a central role in development, in so far as humans find it inherently interesting to seek out novel and challenging situations, to expand their capacities, and to explore their inner and outer environments (Flavell, 1999; Niemiec, Ryan, & Brown, 2008). As such, social contexts that support intrinsically motivated behaviors are critical for healthy emotional, cognitive, and personality development.

*Cognitive evaluation theory* (CET; Deci & Ryan, 1980), a second subtheory within SDT, is focused on the factors that either enhance or undermine intrinsic motivation. In brief, CET posits that satisfaction of the psychological needs for autonomy and competence is essential to the maintenance and enhancement of intrinsic motivation. Moreover, CET posits that the two needs are interactive such that competence in the absence of autonomy will not sustain intrinsic motivation, which is contrary to the self-efficacy theory view (Bandura, 1989). Hundreds of studies have been conducted to date examining the social and intrapersonal factors that affect the experience of intrinsic motivation (see, e.g., Deci, Koestner, & Ryan, 1999).

In the first studies, Deci (1971) reported that participants who received monetary rewards for solving an interesting puzzle, relative to those who did not receive any reward, showed less intrinsic motivation for the activity after the reward contingency was removed. Subsequently, other work showed that intrinsic motivation was undermined by such factors as surveillance (e.g., Plant & Ryan, 1985), deadlines (e.g., Amabile, DeJong, & Lepper, 1976), and competitive pressure (e.g., Vansteenkiste & Deci, 2003), among others. Controlling interpersonal feedback (e.g., Ryan, 1982) and pressured internal states such as ego involvement (Ryan, Koestner, & Deci, 1991) have also been found to undermine intrinsic motivation. Deci and Ryan (1985b) suggested that the reason these events undermine intrinsic motivation is that they shift the perceived locus of causality (de Charms, 1968) from internal to external, resulting in a loss of volition and a thwarting of the need for autonomy. Importantly, factors that are expected

theoretically to enhance volition, including perceived choice (Bao & Lam, 2008; Zuckerman, Porac, Lathin, Smith, & Deci, 1978) and the provision of a meaningful rationale (Koestner, Ryan, Bernieri, & Holt, 1984) have been found to support intrinsic motivation. Finally, studies have shown that the general ambience or climate of a situation (e.g., a classroom) can be characterized in terms of the degree to which it is autonomy supportive versus controlling, and the more autonomy supportive the interpersonal climate the higher the intrinsic motivation of the people (e.g., students) who are in it (Deci, Schwartz, Sheinman, & Ryan, 1981; Ryan & Grolnick, 1986). In sum, the experience of autonomy is of central importance to the behavioral and affective manifestation of the proactive organism and to the prototype of volitional behavior—namely, intrinsic motivation.

Other studies found that positive feedback (Deci, 1971) and optimal challenge (Danner & Lonky, 1981) enhanced intrinsic motivation by providing satisfaction of the basic need for competence, whereas negative feedback diminished intrinsic motivation (Vallerand & Reid, 1984). Thus the experience of competence is also important for intrinsic motivation, although again the experience of competence must be accompanied by the experience of autonomy for it to have a positive impact on intrinsic motivation (Ryan, 1982). Contexts that support both autonomy and competence are referred to as *informational*.

### *Extrinsic Motivation and the Process of Internalization*

Although it is fairly easy to identify behaviors that are intrinsically motivated, particularly among children, the majority of behaviors that people engage in are not inherently satisfying or enjoyable. With age, people acquire a greater number of responsibilities and, therefore, spend more of their time fulfilling social duties and obligations, rather than playing. The type of motivation in which a behavior is performed to obtain some separable outcome is referred to as *extrinsic motivation* (Ryan & Deci, 2000a). Importantly, though, SDT maintains that extrinsically motivated behaviors can vary in the degree to which they are characterized by the experience of autonomy or volition.

Internalization refers to the natural, active process of coming to endorse the value of extrinsically motivated behaviors (Ryan, 1993). Thus the process of internalization is necessary for the self-initiation and maintenance of behaviors that are important for effective social functioning but are not intrinsically motivated. Satisfaction of the psychological needs for autonomy, competence, and relatedness facilitates the process of internalization. In other words, it is unlikely that people will initiate the behaviors that socializing agents (e.g., parents, teachers, physicians) deem to be important if they feel wholly unable to do them (competence) or if they do not feel a strong sense of interpersonal connection to the socializing agents (relatedness). Furthermore, it is unlikely that people will come to volitionally self-endorse the initiated behaviors if they do not feel choiceful in enacting them (autonomy).

SDT suggests that support for all three psychological needs facilitates the process of internalization. However, socializing agents often pit satisfaction of different needs against one another, as is the case when people must forego autonomy in order to get the approval and affection of the socializing agent, a practice that is referred to as parental conditional regard. These need conflicts have been shown to yield negative consequences for behavioral regulation and well-being (Assor et al., 2004).

*Organismic integration theory* (Deci & Ryan, 1985b; Ryan & Connell, 1989), a third subtheory within SDT, states that extrinsically motivated behaviors vary along a continuum of relative autonomy that reflects the degree to which they are internalized into the self. When behaviors have been more fully internalized—and thus are experienced as more autonomous—the value of those behaviors has been assimilated and integrated with other abiding values and interests of the self and, as a result, positive affective, cognitive, and behavioral consequences are expected to follow. The theory specifies four distinct types of regulatory styles that encompass the different degrees to which extrinsic motivation can be internalized into the self.

The least autonomous form of behavioral regulation is referred to as *external regulation*, which describes behaviors that are enacted to obtain a reward or to avoid a punishment. Phenomenologically, externally regulated behavior is perceived as being prompted by factors outside the self and thus such behaviors have an external perceived locus of causality. Moreover, because externally regulated behaviors are dependent upon external contingencies, they are experienced as relatively controlled and demonstrate poor maintenance and transfer once the controlling contingencies have been removed (e.g., Vansteenkiste, Ryan, & Deci, 2008).

The next type of extrinsic motivation along the continuum of relative autonomy is *introjected regulation*, which describes behaviors that are enacted to satisfy internal contingencies such as pride and self-esteem enhancement, or to avoid guilt, self-derogation, and doubt. Thus the contingency that gives rise to the behavior exists inside the person—rather than in the environment, as is the case with external regulation—although the regulation of the behavior has not been fully internalized into the self. Because of this, behaviors that are regulated through introjection still have an external perceived locus of causality and are experienced as relatively controlling. These behaviors often manifest as ego involvement, contingent self-esteem, and the pursuit of extrinsic life goals (cf. Niemiec et al., 2008).

As behavioral regulation proceeds toward greater autonomy, people enact behaviors because of the importance and value that they ascribe to them, which in SDT is referred to as *identified regulation*. This type of self-regulation has an internal perceived locus of causality and is experienced as relatively autonomous because the behavior has personal relevance and is volitional. The process of internalization is completed when the identified regulation is synthesized with other identifications and aspects of the self, resulting in *integrated regulation*. These behaviors have an internal perceived locus of causality and are experienced as fully autonomous. It is important to note that, although both identified and integrated regulation are relatively autonomous,

they are still extrinsically motivated because the behaviors are instrumental to separable outcomes, rather than being based exclusively in inherent satisfactions.

As noted, SDT proposes that internalization is more likely to occur in contexts that allow for satisfaction of the basic psychological needs, a claim that has been supported by findings within the domains of parenting (e.g., Grolnick & Ryan, 1989; Grolnick, Ryan, & Deci, 1991; Niemiec et al., 2006), education (e.g., Grolnick & Ryan, 1987; Williams & Deci, 1996; for a review, see Niemiec & Ryan, 2009), health care (Williams et al., 2006), work (Baard et al., 2004), and close personal relationships (La Guardia et al., 2000), among others. In a laboratory experiment, Deci, Eghrari, Patrick, and Leone (1994) demonstrated that the provision of autonomy support (i.e., a meaningful rationale, acknowledgment of feelings, encouragement of choice, minimization of control) facilitated more internalization for an uninteresting visual monitoring task. More specifically, when there was greater autonomy support, the internalization that occurred tended to be integrated, whereas when there was less autonomy support, the internalization that occurred tended to be only introjected. Thus, using diverse methodologies (i.e., interview, questionnaire, intervention, experiment), research has supported the importance of autonomy-supportive conditions for the facilitation of internalization.

In addition to identifying the factors that promote internalization of extrinsic motivation, SDT also suggests that autonomous self-regulation is associated positively with social functioning and adjustment. The corpus of research supporting this claim is too voluminous to discuss fully (for a more complete review, see Deci & Ryan, 2000; Ryan & Deci, 2000b; Vansteenkiste et al., 2008), so we describe a few recent findings. In the domain of education, studies have revealed relations between autonomous self-regulation and psychological well-being among high school students (e.g., Niemiec, Lynch, et al., 2006), and in the domain of health care, studies have found that higher levels of autonomous self-regulation related positively to the psychological well-being and long-term health-behavior change of adult outpatients (Niemiec, Ryan, Patrick, Deci, & Williams, 2009; Williams, Niemiec, Patrick, Ryan, & Deci, in press). Moreover, autonomous self-regulation was positively associated with behavioral persistence and performance, as well as well-being, among unemployed individuals (Vansteenkiste, Lens, De Witte, De Witte, & Deci, 2004) and gymnasts (Gagné, Ryan, & Bargmann, 2003). Finally, it is important to note that autonomous self-regulation has important advantages when assessed with either implicit or explicit measures, as demonstrated by the finding that people high in autonomous self-regulation were more effective in controlling their prejudice (Legault, Green-Demers, Grant, & Chung, 2007).

### *A Brief Summary*

We conclude this section on the relation of autonomy to self-regulatory processes by highlighting several important findings. First, satisfaction of the needs for autonomy

and competence is critically important for the maintenance and enhancement of intrinsic motivation, which is the embodiment of the proactive organism. Second, internalization, the process through which individuals take in and integrate ambient social and cultural norms and practices, is facilitated by satisfaction of the needs for autonomy, competence, and relatedness. Third, fuller forms of internalization, which are experienced as autonomous self-regulation, are conducive to behavioral persistence and performance, physical health and health-behavior change, psychological well-being, and a range of other positive outcomes. Thus it is clear that autonomy is at the very heart of true self-regulation.

## Self-Determination Theory: The Relation of Autonomy to Personality Development

So far we have discussed the antecedents and consequences of autonomous self-regulation in the context of behavior- or domain-specific processes. However, SDT also recognizes that it is useful to characterize people in terms of their general motivational orientations, which cut across contexts and time. SDT has implemented two approaches to studying autonomy as it relates to personality development—causality orientations and life goals. We consider each in turn.

### *Causality Orientations*

A fourth subtheory within SDT, *causality orientations theory* (Deci & Ryan, 1985a), was formulated to address individual differences in global motivational orientations as they relate to other individual differences and predict behavioral outcomes. The theory posits the existence of three orientations that each exist to varying degrees within people and characterize both their perceptions of the source of behavioral initiation and the motivational processes associated with that initiation. People who are high on the *autonomy orientation* typically view their own needs and values as the initiators of their behavior, interpret external events as informational, and thus regulate their behavior with an experience of autonomy. People who are high on the *control orientation* typically look to external cues or demands to provide impetus for their behavior, interpret these cues as pressuring, and regulate their behavior with an experience of control. People who are high on the *impersonal orientation* typically interpret social contexts as being indicative of their inability to behave in ways that will yield desired outcomes, and thus they experience amotivation and passivity.

Causality orientations are theorized to develop over time as a result of the interaction between the active organism and the interpersonal environment that may be more or less supportive of the basic psychological needs. Thus, for example, as people are repeatedly subjected to controlling forces in various settings and domains, they tend

not only to develop controlled behavioral regulation within particular settings and domains, but gradually this development generalizes such that they tend to be controlled across the many settings and domains they encounter. In other words, they tend to develop a strong control causality orientation. Similarly, the strength of autonomy and impersonal orientations depend on the degree to which people experience autonomy-supportive and amotivating interpersonal contexts, respectively, in their life domains. Therefore, need supportive environments are conducive to the development of a healthy, autonomous personality (Deci & Ryan, 2000).

In their initial investigation, Deci and Ryan (1985a) reported that the autonomy orientation was associated positively with self-actualization, self-esteem, ego development, and a willingness to support the autonomy of others; the control orientation was associated positively with the Type A coronary-prone behavior pattern and public self-consciousness; and the impersonal orientation was associated positively with self-derogation, depression, and social anxiety, and negatively with ego development and self-esteem. More recently, others have found that the autonomy orientation was associated positively with personality integration (Koestner, Bernieri, & Zuckerman, 1992), satisfying personal relationships (Hodgins, Koestner, & Duncan, 1996), and interest and enjoyment in a learning context (Black & Deci, 2000), whereas the controlled orientation was found to be associated positively with ego-defensiveness and driving anger (Neighbors, Vietor, & Knee, 2002).

### *Life Goals*

Life goals, or aspirations, organize and direct behavior over time. As such, the types of aspirations that people pursue can be considered to be a relatively stable, motivationally relevant index of personality. Initial work clarified that there are two quite different types of life goals that were labeled *intrinsic* and *extrinsic* and began to examine the outcomes associated with the pursuit and attainment of intrinsic (viz., personal growth, close relationships, community involvement, physical health), relative to extrinsic (viz., money, fame, image), aspirations (T. Kasser & Ryan, 1993, 1996). These researchers examined the importance of aspirations using adult and college samples and reported that the relative importance of intrinsic aspirations was associated positively with self-actualization, vitality, and positive affect, and negatively with depression, physical symptoms, and narcissism. Subsequently, they (T. Kasser & Ryan, 2001) found that the relative importance of intrinsic aspirations was associated positively with the quality of interpersonal relationships, and negatively with engagement in risky behaviors. The structural relations among these various aspirations have been observed among diverse cultural groups (Grouzet et al., 2005).

T. Kasser and Ryan (2001) proposed that there is an integral association between the pursuit and attainment of aspirations and satisfaction of the basic psychological needs. To support this, T. Kasser et al. (1995) reported that mothers' provision of support for autonomy and relatedness related positively to their teenage children's

placing relatively high importance on intrinsic aspirations. Recently, Niemiec, Ryan, and Deci (2009) conducted a longitudinal study to examine the relations of *attaining* intrinsic and extrinsic aspirations to positive and negative indices of psychological health. We found, as expected, that the attainment of intrinsic aspirations related positively to well-being and negatively to ill-being. Moreover, the attainment of extrinsic aspirations made no contribution to well-being, and actually related positively to ill-being. Importantly, the relation of change in attainment of intrinsic aspirations to change in psychological health was mediated by change in psychological need satisfaction.

### *A Brief Summary*

To conclude this section on the relation of autonomy to personality development, we highlight several important findings. First, people who experience autonomy at the level of their personality are more likely to approach situations in ways that allow for satisfaction of the basic psychological needs for autonomy, competence, and relatedness. Moreover, people who are high on the autonomy orientation report higher levels of psychological health and social functioning, whereas the converse is true for people who are high on the control or impersonal orientations. Second, satisfaction of the basic psychological needs is important for people's valuing intrinsic, relative to extrinsic, aspirations. Third, both the valuing (Vansteenkiste et al., 2007) and attainment (Niemiec et al., 2009) of intrinsic aspirations are conducive to psychological need satisfaction, which in turn relates positively to psychological health.

## The Self in Self-Determination Theory

Throughout, we have made reference to the concept of "the self." Within SDT, the self is defined as the core of the synthetic process within individuals. It is the means through which the innate integrative tendencies facilitate psychological growth and adaptation to the social environment. In motivational terms, the self includes intrinsic motivation and well-integrated extrinsic motivation (viz., identified and integrated regulation). Therefore, in contrast to Pinker (2002) and others who have asserted that the self is a myth, we maintain that the construct of the self refers to synthetic, integrated functioning, which is manifest in distinct neuropsychological, phenomenological, and functional processes. When people are acting from their integrated self, they will be autonomous in their actions and experience a high level of well-being. By contrast, when acting from external or introjected regulation, people do not experience behavior as emanating from the self, and as a result they are less wholehearted in their pursuits, as reflected in lower behavioral persistence and performance, vitality, and satisfaction.

## Conclusion

We began this chapter by drawing parallels between the historical tendencies for people to resist control and to seek freedom, and the tendencies within individuals to seek autonomy, to thrive under conditions of autonomy support, and to develop in the direction of autonomous self-regulation. Central to our argument is that there is a natural or inherent propensity toward self-organization, self-endorsement, and self-regulation of behavior, and correspondingly, there are deleterious effects on energy and wellness when behavior is heteronomously controlled. We outlined some of the central principles of self-determination theory and reviewed considerable empirical evidence suggesting that the experience of autonomy is critical for the maintenance and enhancement of intrinsic motivation, the internalization of extrinsic motivation, and the development of a healthy personality and system of values. Furthermore, whereas the positions of Markus and Kitayama (1991), Jordan (1997), and Stephens et al. (2007), when combined, suggest that autonomy is relevant only for Western males from middle or upper classes, many studies point to the functional importance of autonomy and volition across cultures, gender, and social class. This does not mean that everyone faces the same obstacles to autonomy, but rather that the relations between autonomy and outcomes are not moderated by these differences.

Autonomous functioning is at once a phenomenological, functional, and biological phenomenon. The experience of an internal perceived locus of causality corresponds to particular features of behavior, such as its quality, equifinality, and persistence, and to particular neuropsychological underpinnings (see Ryan & Deci, 2006). Thus, in contrast to the view espoused by Wegner (2002), autonomy is *not* an illusion, but rather a description of a fully functioning organism, unified in its actions. At the same time, as an abundance of research makes clear, autonomy is a form of functioning that is heavily influenced by social contexts and the supports for psychological need satisfaction they afford.

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# 9

# *Interest and Self-Regulation*

## Understanding Individual Variability in Choices, Efforts, and Persistence Over Time

**Carol Sansone, Dustin B. Thoman, and Jessi L. Smith**

*Motivation is simple. You eliminate those who are not motivated.*

(Lou Holtz)

As the quote by famed college football coach Lou Holtz illustrates, we often identify people as "motivated" or "unmotivated," as if people have a central motivation switch that turns on and off. Alternatively, we distinguish between people in terms of the reasons that typically motivate them (e.g., intrinsic v. extrinsic), acknowledging the possibility of a group of people who are apparently unmotivated by any reason (the latter group usually associated with some type of mental health problem, such as depression). In these examples, then, we see attempts to identify individual differences in motivation in terms of characteristic levels of motivation (i.e., high or low), and in terms of its characteristic direction (i.e., the things that people are typically motivated by or for).

While allowing for individual variability in these dimensions, our model of motivation suggests that the amount and direction of motivation are not static factors that people bring to a situation. Rather, these are dimensions that can be intentionally regulated by a person over time and contexts. To better understand how individuals vary, therefore, we must consider the self-regulation *process*. We suggest that although the process is universal, personality and individual differences impact the process to create distinct motivational patterns for each individual. For example, personality and individual difference characteristics affect whether and how motivation is regulated. In turn, the process of regulating motivation helps to create the contexts that are maintained in a person's life and contributes to how that person comes to define him or

herself. We suggest that conceptualizing motivation in terms of a self-regulatory process provides an organizing framework for understanding the influence of numerous individual differences, and provides clues as to how motivational differences at a single point in time may translate into characteristic differences between individuals as well as variability within individuals.

## Self-Regulation of Motivation Model

### *Overview of the General Model*

Figure 9.1 illustrates our model of the self-regulation of motivation process (Sansone & Harackiewicz, 1996; Sansone & Smith, 2000; Sansone & Thoman, 2005) captured at a particular point in time. Although the model is described in detail elsewhere, we wish to make several points. First, it is important to distinguish the higher level individual and contextual factors (e.g., personality traits, age, culture) that may often direct motivation across many situations from the direction of motivation in a particular situation. The direction in a particular situation is reflected in individuals' goals, which may vary within the person over time. In terms of directing motivation, goals reflect both the "what" (e.g., complete the task, score better than a standard) and the "why" (e.g., to achieve, to have fun) of activity engagement (what Harackiewicz and Sansone, 1991, termed "target goals" and "purpose goals," respectively). When the goals are defined in terms of reaching some outcome as the result of engagement, rather than in terms of engagement as its own end, the motivation to reach these goals is typically labeled "extrinsic." This motivation can vary in intensity, as a function of how much the individual values the goals and expects to attain them.

Knowing the direction and intensity of individuals' motivation as they begin an activity is not sufficient, however. In many self-regulation models, the evaluation of goal progress is proposed to create distinct affective experiences during activity engagement (see the evaluation box in Figure 9.1). For example, according to Carver and Scheier's control theory model (see Carver, 2004; Carver & Scheier, 2009, for recent overviews), if the rate of progress toward one's goals is judged greater than the standard used for evaluation, positive affect results. If rate of progress is slower, in contrast, negative affect results. In turn, the affective valence is proposed to affect subsequent goal-directed behavior, with negative affect leading to greater effort, and positive affect leading to decreased effort.

In contrast, we suggest that the affect that results from evaluation of goal-related progress is one source of motivation, but is not the only, or necessarily the most important, source. Regardless of goal progress, motivation to continue or resume the activity will also depend on the degree to which working on the activity is interesting. The kind of motivation based on the interest experience is typically labeled "intrinsic,"

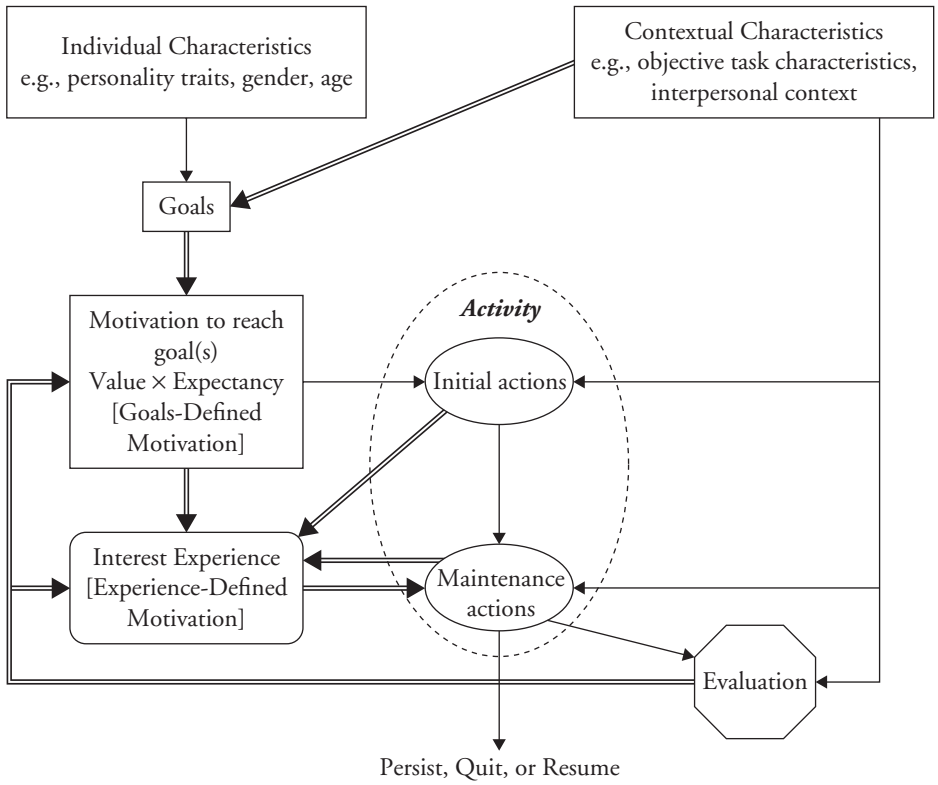


**Figure 9.1.** Self-regulation of motivation model (adapted from Sansone & Smith, 2000). The left-hand side of the figure illustrates the part of the process that occurs within the individual; the right-hand side of the figure illustrates the role of the context at various points in the process. In the middle lies the "activity," which is composed of the actions resulting from the transaction among individuals' goals, task characteristics, and the context in which the person performs the activity at a particular point in time. Double lines indicate relationships that may be moderated by individual differences. For simplicity's sake we have illustrated a "snapshot" of this process at a particular point in time. Over time, however, we expect that the individual and contextual characteristics will have a reciprocal influence.

because it is defined in terms of the experience of the activity itself, rather than in terms of possible outcomes. According to our model, "extrinsic" and "intrinsic" motivation do not necessarily occur at opposite ends of a single continuum. Instead, we assume that individuals may be motivated to engage in an activity both because it brings about some desired outcome *and* because it is interesting. Thus we use the terms "goals-defined" and "experience-defined" motivation to highlight the relative roles of these two kinds of motivations within a single self-regulatory process.

Moreover, our model suggests that goals-defined and experience-defined motivation may be interrelated over time (e.g., Eccles, Adler, & Meece, 1984; Lepper, Greene, & Nisbett, 1973). Thus we suggest that it is important to attend to both kinds of motivation when attempting to understand individuals' motivation. For example, if a student who is motivated to get a good grade in a class (goals-defined motivation) finds reading the assigned class material to be interesting (experience-defined motivation), then the student's actions will be oriented in the same direction by both kinds of motivation. In this circumstance, individuals are more likely to focus attention on the task, persist, and resume the activity when given the opportunity in the future.[1]

If the experience of reading the class material is uninteresting, however, then the motivation associated with the experience pushes in a different direction (quitting) than the direction associated with the individual's goal (persisting). For an individual to persist under these circumstances, his or her motivation to reach the goal needs to be stronger than the motivation to experience interest.

It is at this point in the model that the advice from Lou Holtz becomes premature. If individuals do not have sufficient goals-defined and/or experience-defined motivation, they may be unmotivated, but they do not necessarily have to remain so. Instead, individuals may purposely engage in actions to enhance their motivation (maintenance strategies). One option is to engage in strategies that enhance motivation to reach the goals (e.g., reminding oneself about the importance of getting a good grade in a class; Wolters, 1999, 2003). As noted in our model, however, motivation to reach the goals is itself one source of the interest experience. As such, strategies used to enhance goal-defined motivation may also affect experience-defined motivation, in positive or negative ways. For example, if reminding oneself about the importance of grades leads to greater involvement in class activities, greater interest might result. Alternatively, if reminding oneself about the importance of grades leads to greater anxiety about possible failure, then distraction and lower interest might result. Thus regulation efforts aimed at increasing goal-defined motivation can increase persistence despite the lack of interest. But by affecting the experience during activity engagement, these strategic actions can in turn influence experience-defined motivation (Ferguson & Bargh, 2004).

In addition to the option of enhancing goals-defined motivation (and perhaps indirectly affecting experience-defined motivation), a second option is for individuals to engage in maintenance actions with the intention of making performance of the activity more interesting (e.g., trying to make connections between the reading and everyday life). Individuals are more likely to engage in interest-enhancing strategies when they feel it is important to persist at an uninteresting task, and so "extrinsic motivation" can paradoxically lead to greater "intrinsic motivation" if it motivates the effort to regulate interest. One potential consequence of choosing this option, however, is that actions that make the experience more interesting can also interfere with or delay reaching the goals (e.g., time spent on surfing the web for related material may come at a cost to time spent studying assigned material).

### *The Role of Individual Differences*

In conceptualizing motivation as part of a self-regulatory process that unfolds over time, we can start to identify places where characteristic differences between people can result in a different picture of the motivation process. Although we consider the general *process* to be similar across people, individualized patterns of motivation might result over time as a consequence of how personality and individual differences impact the process at different points. The double lines in the figure illustrate relationships among the different elements of the model that may be moderated by individual differences. Research from a variety of perspectives has identified important differences in the goals individuals characteristically hold, and in the goals they adopt in a particular context (e.g., Cantor & Kihlstrom, 1987). Research suggests, however, that even when holding the same goals individuals may vary in how motivated they are to reach them, because they differ in how much they value the goals and expect to attain them (Eccles et al., 1984).

There is relatively little research on how personality or individual differences may impact experience-defined motivation, and that is our focus for the remainder of the chapter. For example, even if individuals are motivated to work toward the same goal, will working toward that goal be associated with the same experience of interest? When working toward the goal is not associated with interest, our model suggests that individuals may vary in terms of their maintenance actions, leading to different choices among the possible options (i.e., persisting without interest, quitting, or strategically changing the experience to be more interesting). Individuals may further differ in terms of the kinds of strategies they use (e.g., make performance more challenging v. work on the task with others). In the next sections, we briefly discuss research that illustrates how individual differences affect this process at each of these points in the process.

## Individual Differences Influence Whether Working Toward Particular Goals is Associated with Interest

As represented in the top left of Figure 9.1, even before the activity begins, individual differences influence the goals that individuals characteristically adopt in general and in response to a particular context. These goals include the purpose for engaging in the activity as well as the specific actions required (Harackiewicz & Sansone, 1991). A number of hierarchical motivation models (e.g., Elliot & Harackiewicz, 1996; Harackiewicz & Sansone, 1991; Vallerand, 1997) suggest that the things that individuals characteristically value (e.g., achieving, being autonomous) will be one important influence on what they try to accomplish and why. Because the goals are based on chronic values and are likely associated with greater experience, the motivation to

reach these goals is also likely to be relatively high because individuals care about these goals and expect that they can reach them (the double arrows from "Goals" to "Motivation to reach goals" in Figure 9.1).

As noted, however, our model suggests that the motivation to reach these goals is not the only determinant of motivated engagement. It is also important to address whether working toward these goals is associated with the experience of interest. Researchers have suggested that certain goal types are typically associated with greater or lesser interest for most people. For example, research based on self-determination theory (Deci & Ryan, 1985) suggests that individuals who engage activities to satisfy internally or externally generated constraints will feel pressured and controlled, a state that interferes with interest. To the extent that individuals differ in the degree to which they characteristically engage in activities with these controlling goals, they will differ in the extent to which they experience interest (Deci, 1992; Ryan & Connell, 1989). However, as we illustrate in the next section, even though particular types of goals may in general be associated with greater interest, it would be a mistake to assume that this relationship holds true for everyone. Individual differences may moderate the relationship between the expectancy and value of reaching those goals and interest (see the double arrows from "Motivation to reach goals" to "Interest experience" in Figure 9.1), and/or moderate the degree to which initial actions in service of those goals are experienced as interesting (the double arrows from "Initial Actions" to "Interest experience"). We highlight a few of these important individual differences below.

### *Achievement Goals and Interest*

Researchers have distinguished between learning or mastery goals (where achievement is defined in terms of developing skills, exerting effort, and/or learning new things) and performance goals (where achievement is defined in terms of demonstrating competence to others), with only mastery or learning goals hypothesized to be associated with the experience of interest. Researchers have also suggested that there may be individual differences in the likelihood of adopting mastery versus performance goals. For example, Dweck and colleagues suggest that individuals may hold different implicit theories about the nature of intelligence. Individuals holding incremental theories (intelligence level can be improved) are more likely than individuals holding entity theories (intelligence level is fixed) to adopt learning goals, to be less likely to interpret failure as a sign that they cannot reach these goals, and to experience greater interest while learning (Dweck & Leggett, 1988; Mueller & Dweck, 1998).

However, this generalization became more complicated by findings that performance goals were not necessarily associated with lower interest. Several researchers have suggested that "performance" goals actually confounded several important subcategories that could have different relationships to interest. One important subcategory is whether the performance goal is framed in terms of approaching a positive outcome versus avoiding a negative outcome (Elliot & Church, 1997). Research conducted in college

classrooms showed that mastery goals were associated with greater interest in the learning topic but that performance approach goals were associated with better grades (Harackiewicz, Barron, Tauer, & Elliot, 2002). In the laboratory, however, performance approach goals have been associated with greater interest for individuals higher in achievement orientation (Barron & Harackiewicz, 2001). For example, independent of the competition outcome, women higher in achievement motivation found the experience of working on a puzzle more interesting when it involved competition, compared to women lower in achievement motivation (Tauer & Harackiewicz, 1999).

In contrast to the sometimes positive effects found for performance approach goals, performance avoidance goals appeared to be consistently associated with lower interest (Elliot & Harackiewicz, 1996). Mediation analyses suggested that this was the case because the motivation to reach performance avoidance goals was more likely to include lower expectations or doubts about ability to reach the goal, and value was experienced as worry (negative) rather than importance (positive) (Elliot & McGregor, 1999; Elliot & Sheldon, 1997).

Recent research by Smith, Sansone, and White (2007) suggests, however, that even avoidance goals may not always be detrimental to interest for everyone. In particular, women who were characteristically lower in achievement motivation tended to report greater interest in a computer science activity when the context led them to adopt avoidance goals in the face of negative gender-based stereotypes, relative to when the context lead them to adopt approach goals. This effect on interest in the activity was mediated by the degree of task absorption while working on the activity. Thus, for women who did not typically value achievement, striving to avoid the demonstration of incompetence in the context of gender-based stereotypes allowed them to become engaged in the task in a way that striving to demonstrate competence did not.

The important point of these lines of research is that the relationship between performance goals and interest appears to depend on individual differences (i.e., in achievement orientation), in combination with the specific (achievement) context. Thus particular achievement goal types may not always be automatically associated with greater or lesser interest. Rather, the relationship to interest can depend on the degree to which the experience of working toward a particular goal is congruent with the characteristic values of the person.

### *Interpersonal Goals and Interest*

Other research suggests that the relationship between goal congruence and interest is not limited to goals defined in terms of competence or achievement at the task (Sansone, Sachau, & Weir, 1989). In particular, other people can be an important source of interest in an activity. According to our model, the more individuals are characteristically oriented toward and value the presence of others, the more likely they will be to approach even achievement tasks with interpersonal goals. One consequence is that

whether these individuals experience interest will partially depend on whether their interpersonal goals are congruent with the context (e.g., whether they are able to work with others or must work alone).

To test this possibility, Isaac, Sansone, and Smith (1999) identified individuals who would be most likely to approach activities with goals to work with others (individuals higher in interpersonal orientation, IO, as assessed by Swap and Rubin's, 1983, Interpersonal Orientation Scale). Previous research suggested that women tend to score higher on this scale than men, but that both men and women are represented at all points along the distribution. Individuals who score higher on this scale are particularly sensitive to others and demonstrate an affective involvement with others (Rubin & Brown, 1975; Smith & Ruiz, 2007). Once individual differences in IO were identified, Isaac et al. (1999) varied the actual presence of other people (actually a same-sex confederate). Confirming predictions from our model, Isaac et al. found that individuals higher in IO expressed greater interest in the task and were more likely to engage in future similar tasks when working in the presence of another person, whether they worked with or just alongside the person.

Smith and Ruiz (2007) hypothesized that congruence with the interpersonal context involved not just the physical presence of another person, but also the quality of the interpersonal interaction. In particular, they reasoned that individuals higher in IO would experience congruence when the interaction was warm and friendly, but not when the interaction was hostile and cold (and vice versa for individuals lower in IO). Thus, rather than expecting the quality of the interpersonal interaction to have the same effect for everyone, they proposed that whether the interpersonal interaction was experienced positively or as stressful would depend on individuals' characteristic interpersonal orientation. Women higher and lower in interpersonal orientation (as measured by the Swap and Rubin, 1983, scale) were randomly assigned to work with a same-sex confederate who behaved unambiguously warm or cold (or neutral) during a teaching task. Results showed that although the challenging teaching task elicited cardiovascular reactivity (a reflection of stress) in all participants, individuals displayed significantly less cardiovascular reactivity when they were in congruent conditions (i.e., for individuals low in IO, working with a cold confederate; for individuals high in IO, working with a warm confederate) compared to incongruent and neutral conditions. In addition, incongruent conditions triggered more ruminative thoughts about the partner compared to congruent conditions, suggesting not only physiological distress, but also more psychological discomfort with the situation (e.g., Bermudez & Perez-Garcia, 1996; Lyubomirsky & Nolen-Hoeksema, 1993). These results suggest that one reason that individuals may be less able to experience interest when working in contexts that are incongruent with their goals is because of the physiological and psychological discomfort that it causes.

A study by Morf, Weir, and Davidov (2000) suggested that goal congruence may positively affect interest even when the personality trait associated with the goal may itself be considered interpersonally problematic. In particular, they reported a congruence effect involving individual differences in narcissism, such that high

narcissism males found a task more interesting when working to attain ego goals, whereas low narcissism males found the task least interesting in the same circumstances.

Together, the studies involving both achievement and interpersonal goals caution against trait-like conceptualizations of "optimal" goals, because what is optimal for a particular person's motivation may be specific to that person and the particular situation (Barron & Harackiewicz. 2001). More generally, this brief review of the literature suggests that distinguishing individuals only in terms of the kinds of goals they are likely to adopt is not sufficient for understanding or predicting their motivation. By plugging these kinds of individual differences into the self-regulatory process, it becomes clear that we also need to understand how motivation to reach particular goals is associated with the experience of interest for a particular person in a particular context.

## Individual Differences Influence Whether People Regulate the Interest Experience

As the previous section illustrated, there are a host of influences on whether individuals experience interest as they initially engage in an activity, some of which come from the task itself, but many also coming from what individuals bring to the task and the congruence with the task and surrounding context. We now consider what occurs when individuals are faced with a task that they do not find interesting. Our self-regulation of motivation model suggests that if motivation to reach some outcome is strong enough, it may overcome the conflicting urge to quit created by the lack of interest. Alternatively, instead of trying to stick it out without interest, individuals may do something to try to enhance their experience of interest. As illustrated by the bidirectional double arrows in Figure 9.1 between "Interest Experience" and potential maintenance actions, individual differences can moderate whether people strategically change the activity to regulate their experience-defined motivation.

### *Differences in the Importance of Regulating Interest*

Sansone, Wiebe, and Morgan (1999) proposed that individuals might differ systematically in terms of whether they choose to actively regulate interest. They suggested that, in particular, individuals might differentially weigh the costs and benefits associated with both regulating interest and with not regulating interest. For example, if individuals choose *not* to regulate interest, one potential cost is that they may be more likely to stop the task. If individuals do persist in performing a boring task, in contrast, they may be more likely to face the potential cost of experiencing stress-related effects on psychological and physical well-being (Csiksentmihalyi, 1975).

On the other hand, if individuals choose to do something to enhance interest, this option may have costs as well. For example, Sansone, Weir, Harpster, and Morgan

(1992) found that individuals who engaged in interest-enhancing strategies while performing a repetitive copying task also copied less during the time period allowed. Thus a potential cost of regulating interest is that it detracts from performance, at least in the short term and as measured by others' standards. Another potential cost of regulating interest is that it requires effortful action, whether at the cognitive or behavioral level. Resources spent regulating interest may thus come at a cost to meeting other demands. Finally, a potential cost to regulating interest is that it may allow one to persist at a task when in fact the best option for that person would be to quit (e.g., staying in a dead-end job rather than looking for a new one).

Sansone et al. (1999) contrasted two individual differences, conscientiousness and hardiness, that they thought should illustrate the differential weighing of these costs and benefits. Using the earlier Sansone et al. (1992) paradigm, they asked college students to copy letter matrices for as long as they felt was needed to "accurately evaluate" the task. The number of letters that students copied became the measure of persistence. Sansone et al. also varied whether students were given an explicit reason to value the boring task (that the feedback would allow researchers to develop jobs for others). According to Sansone et al. (1992), individuals given the added reason to value the task should be more likely to regulate interest than individuals not given the added reason. However, Sansone et al. (1999) expected that these earlier findings would be moderated by individual differences in hardiness and conscientiousness.

Individuals high in conscientiousness (Costa & McCrae, 1991) were expected to weigh the achievement outcome as paramount and be more likely to persist without using interest-enhancing strategies that may interfere with performance. In contrast, individuals high in hardiness (Kobasa, 1979; Wiebe & Williams, 1992) were expected to weigh the quality of their subjective experience more heavily, and be more likely either to quit the activity (if there was not a sufficient reason to persist) or to engage in interest-enhancing actions. As expected, high conscientious individuals persisted longer than individuals lower in conscientiousness independently of the reason manipulation or strategy use. In contrast, high hardy individuals persisted primarily when they were provided the additional reason to perform the task, and this effect was mediated by their attempt to make copying more interesting.

The juxtaposition of these two individual differences suggests that individuals may not differ in terms of a general tendency to regulate interest. Instead, individuals may differ in the extent to which motivation to reach goals and motivation based on the experience are attended to and considered important. When individuals characteristically weigh goals-defined motivation as more important, such as in the case of individuals high in conscientiousness, the lack of motivation derived from the boring experience is not as critical for their persistence. When individuals are more highly attuned to the quality of their subjective experience, however, such as may be the case for high hardy individuals, then they may weigh both motivations as important, and only expend the effort to regulate interest when persistence seems worthwhile.

### *Differences in the Ability to Regulate Interest*

A second kind of individual difference that may be important in terms of whether individuals try to regulate interest has to do with the *ability* to self-regulate. Several researchers and clinicians have noted that lack of motivation due to boredom may be particularly problematic for individuals with chronic psychological problems, because they are in some way lacking the executive functions to regulate interest. Clinically, the inability to develop or sustain interest may be at least partially responsible for motivational deficits of people with affective disorders such as depression and bipolar disorders (Papolos & Papolos, 2004). Todman (2003) cites boredom as a serious problem in a number of disorders, including schizophrenia. Todman (2003) suggests that by failing to recognize the importance of experiencing interest, we may also fail to recognize that problems such as failure to sustain treatment are reactions to boredom, particularly for individuals beginning to recover from psychotic breaks. As a consequence, clinicians may provide treatments that do not help and may exacerbate the problem. Todman (2003) recommended improving diagnostic tools for assessing lack of interest and suggested that "it might be possible to improve the boredom-coping skills of some boredom-prone individuals with adequate training and the appropriate clinical technology" (p. 163).

Considering these extreme clinical ranges in the ability to self-regulate interest underscores the pragmatic importance of understanding the interest experience and the process of interest regulation. Impairments in the ability to regulate the experience of interest can dramatically influence the ongoing process of motivation in people's daily lives. At the clinical extremes, sustaining motivation (regardless of the goal) may seem impossibly difficult, but it is possible that even when not focusing on the extremes, sustaining motivated engagement via self-regulation may be easier for some people than others.

## Individual Differences in How People Regulate the Interest Experience

Assuming that individuals have decided to regulate interest, there may also be individual differences in terms of the kinds of strategies they try to use (as indicated by the same bidirectional double arrows in Figure 9.1 between the interest experience and maintenance actions). To some extent, of course, the use of particular strategies is shaped by the parameters of the task and situation (shown in Figure 9.1 by the arrows from the "Contextual characteristics" box to the actions which comprise the "Activity"). For example, Sansone et al. (1992) found that, when asked, individuals suggested different interest-enhancing strategies depending on whether their task involved copying letter matrices in their own handwriting, copying letter matrices in

the special fonts displayed (as in calligraphy), or finding words hidden in the letter matrices (as in a word game). Nevertheless, even when attempting to regulate interest in the same activity, individuals may differ in the kinds of strategies they are predisposed to use. For example, compared to individuals lower in achievement motivation, individuals higher in achievement motivation may be more likely to introduce competition as a way to make a task interesting (Tauer & Harackiewicz, 1999).

Although a number of individual differences can influence the kinds of self-regulation strategies individuals might employ, for illustration purposes we focus on differences in interpersonal orientation. As discussed below, consideration of research on individual differences in interpersonal orientation helps to demonstrate several unique implications of our model, including the potential fluidity of an "activity" definition (encompassing both initial *and* maintenance actions), and how presumably "extrinsic" factors (such as the social context) can in fact become part of the activity for some individuals.

In the Isaac et al. (1999) study discussed previously, we were able to examine via videotapes participants' interpersonal interactions when the confederate was present. We found that although there were no differences in the total number of exchanges between the participant and the confederate as a function of IO level, differences emerged in the quality of the interactions. Relative to lower IO individuals, individuals higher in IO interacted with the confederate in a more interpersonally involving manner (e.g., expressing thoughts and information to a greater degree). This interaction style seemed to draw behavior out of the confederate (more off-task conversation) that predicted greater interest in the activity for higher IO individuals.

In fact, a major difference between higher and lower IO individuals was in how off-task interactions were related to participants' interest and performance. Lower IO individuals appeared to identify off-task conversation as extrinsic to the activity. For example, off-task conversation was associated with their being more likely to commit math errors while performing. In contrast, higher IO individuals did not appear to distinguish between on-task and off-task interactions. For example, off-task conversation by the confederate was associated with greater interest for higher IO individuals, and higher IO individuals were *not* more likely to commit math errors when there was off-task conversation. In terms of our model, this pattern suggests that for higher IO individuals, interpersonal interactions were "intrinsic" to the activity and helped to make the experience of working toward the achievement goal more interesting. Interest, in turn, predicted their likelihood of engaging in a similar activity in the future. For lower IO individuals, interpersonal exchanges were both intrinsic (when on-task) and extrinsic (when off-task), such that the presence of others was associated with a mixed motivational payoff.

In the study by Smith and Ruiz (2007) discussed previously, although the experimental constraints on the interpersonal interactions ostensibly limited individuals' ability to regulate the experience, the researchers found that participants still attempted to elicit goal-congruent responses from the confederate in the only way available to them—through nonverbal behavior. Body orientation is a useful index of nonverbal

communication to assess what response (warm or cold) an individual is attempting to elicit from an interaction partner (e.g., Hall, Harrigan, & Rosenthal, 1995; Kiesler, 1983, 1996; Markey, Funder, & Ozer, 2003; Nowicki & Manheim, 1991). Thus, although participants were limited by a blood pressure cuff and told specifically to "remain still" during the teaching task, participants high in interpersonal orientation in the cold (incongruent) condition had the highest proportion of "forward lean," suggesting they were attempting to elicit friendliness and warmth from the cold confederate. In contrast, participants low in interpersonal orientation in their incongruent condition (working with a warm confederate) had the highest proportion of "backward lean," suggesting they were attempting to distance themselves or elicit hostility from the friendly confederate. These results suggest that despite constraints placed by the context, individuals will use the strategies available to them even if the strategies might counter what they "should" be doing.

The tendency to use interpersonal strategies in the face of directly contrary instructions illustrates a second implication of the model. That is, characteristic differences in how individuals regulate both goals-defined and experience-defined motivation may help explain how individual-level behaviors can translate into motivational differences typically explained by group membership. For example, although the social world is important for everyone to some extent (Baumeister & Leary, 1995; Deci & Ryan, 2000), women (Morgan, Isaac, & Sansone, 2001; Strough, Berg, & Sansone, 1996) and individuals from collectivistic cultures (Thoman, Sansone, & Pasupathi, 2007) tend to report characteristically higher levels of interpersonal orientation. Consideration of differences in interpersonal orientation may thus contribute to a greater understanding of why individuals who identify with or belong to different social groups might have different levels of motivation to perform an activity, a motivational difference that remains even when controlling for issues of competence and experience (Morgan et al., 2001; Smith & Ruiz, 2007).

Recently, Thoman et al. (2007, Study 1) examined how the social context and characteristic differences in interpersonal orientation may influence interest even after the activity is over, assessing interpersonal orientation both directly (interpersonal orientation scale) and indirectly (group membership defined by ethnicity and gender). As one part of a questionnaire study, college students were asked to describe a time that working on a school-related activity was more interesting because they were working with another person or persons. Individuals were asked to report the frequency with which they talked with their collaborator(s) or other people about the activity prior to and after working on the activity, and if they were more or less interested in the activity after these conversations. Thoman et al. (2007) were particularly interested in the effects of conversations after the task was completed. Although the "Evaluation" box in Figure 9.1 has typically referred to evaluation in terms of progress toward the goal, our model suggests that evaluation could also occur in terms of the interest experience. Conversations with others prior to performing the activity are likely to be oriented toward getting the school-related task done (i.e., the outcome goal). Conversations after the task is completed, in contrast, may be more likely to be related

to making sense of the experience and determining how individuals felt about the task (Pasupathi & Rich, 2005).

To capture individual differences in interpersonal orientation, Thoman et al. (2007) first examined group-level variables proposed to be associated with different interpersonal orientations. In particular, they examined whether females differed from males, and whether individuals from more collectivistic ethnic backgrounds (Hispanic/Latino and Asian) differed from individuals from more individualistic ethnic backgrounds (European-Americans). They also included a more direct measure of interpersonal orientation (Cross, Bacon, & Morris's, 2000, measure of Relational-Independent Self-Construal, RISC). According to Cross et al., the RISC measure captures differences in the degree to which individuals define themselves in terms of their relationships with others. A number of studies have found that individuals who score higher on this scale are better able to predict others' feelings and attitudes (e.g., Cross & Morris, 2003), and are perceived by others as open and responsive to others' concerns (Cross et al., 2000). Thoman et al. (2007) examined whether differences on the RISC scale predicted frequency of conversations with others about the activity, and the extent to which posttask conversations were related to how interesting individuals found the task.

In terms of group-level differences, Thoman et al. found that Latino/Hispanic students reported talking with their collaborators after the task was completed significantly more often than did other ethnic groups. They were also significantly more likely to find the activity more interesting after the conversation. In contrast, there were no significant effects as a function of gender.

When looking at the more direct (and continuous) measure of interpersonal orientation, Thoman et al. found that RISC scores significantly predicted greater self-reported frequency of conversation with others about the task after its completion, and greater interest in the task after these conversations. These findings suggest that the direct measure of interpersonal orientation was more sensitive than was the group level marker of gender in identifying these differences in postconversation evaluations. The effects for ethnicity and RISC suggest that even though all participants were describing activities where working with others made it more interesting, people who characteristically approach activities with a greater focus on and inclusion of others may be more likely to rely on the social context as a way of evaluating their activity experience. As such, the role of others may continue even after the experience is over.

Together, these results illustrate that individual differences affect not only what individuals try to accomplish and why, but also how they try to accomplish it. When individuals are allowed to work on an activity in a way that makes the activity more interesting to them, they find the experience more interesting and are more likely to voluntarily engage in related activities in the future (see Freitas & Higgins, 2002, for a similar point in the context of differences in self-regulatory focus). This is the case even when the way in which they would make an activity interesting is ostensibly "extrinsic" to the task, such as is the case when discussing the social context. If these "extrinsic" behaviors are blocked (e.g., conversations are forbidden because they are

not required to complete the task), then an important source of continued motivation may also be blocked. Failure to acknowledge this possibility may be particularly critical when the dimension along which people vary, such as the inclusion and importance of others in everyday tasks, is also associated with group level variables such as gender, culture, and ethnicity (Fiske, Kitayama, Markus, & Nisbett, 1998).

These findings are also important because they suggest that even though something (such as the presence of others) makes the experience of performing the activity more interesting, that same factor may only contribute to future motivation if it is seen as part of the task (which is more likely when it is congruent with the values that individuals bring to the task) (Renninger, 2000). For example, individuals in the Isaac et al. (1999) study rated the task as more interesting when they worked in the presence of others, no matter their level of interpersonal orientation. However, this situation-based interest only predicted likelihood of future engagement for individuals higher in interpersonal orientation. In line with our discussion in previous sections, this pattern of findings suggests that differences in how individuals might characteristically choose to regulate interest must be understood in light of the larger self-regulatory process, including congruence with individuals' goals and the surrounding context.

## Long-Term Effects of the Self-Regulatory Process

Using the self-regulation model as a framework for conceptualizing individual differences in motivation has implications for understanding long-term patterns in individuals' lives. For example, for many long-term outcomes (e.g., careers), this motivational process is most proximal to the choices that cumulatively comprise the outcome. From this perspective, whether patterns are considered adaptive or maladaptive must be judged in light of the need to maintain motivation to achieve outcomes *and* motivation to experience interest.

According to our model, the failure to regulate interest successfully can take one of three forms. In the first, individuals may fail to find interest within their long-term commitments but remain committed and persist without interest. Persisting in a major life domain without regular experiences of interest, or with the general feeling of boredom, can lead to increased stress and burnout (O'Hanlon, 1981) or feeling a lack of meaning in life (Barbalet, 1999).

In the second form, individuals may search for interest in ways that are destructive to the person, successful performance, or other people. Research has found associations between regular experiences of boredom and several social problems, including gambling (Blaszczynski, McConaghy, & Frankova, 1990), substance abuse (Iso-Ahola & Crowley, 1991), delinquency and vandalism (Newberry & Duncan, 2001), and drunk driving (Arnett, 1990). Others have suggested that these socially problematic behaviors could be significantly reduced if these individuals could regulate their

motivation by more frequently engaging in positive interesting activities (Csikszentmihalyi, 1990; Miculas & Vodanovich, 1993, Watt & Blanchard, 1994; Wegner & Flisher, 2009).

In the third form, individuals may be unable to regulate interest because of constraints in the context, and choose to quit rather than persist. In this case, individuals may opt out of worthwhile, meaningful, or lucrative professions or relationships even though they have the ability to succeed (Morgan, Isaac, & Sansone, 2001). All three options have implications for the nature and quality of long-term behavior patterns.

Up to this point we have described the effects of personality and individual difference characteristics primarily in terms of how they impact or moderate the process at one point in time. We now consider how their effects on the self-regulatory process can, over time, contribute to the contexts in which we characteristically find ourselves, and to the kind of person we become (i.e., our identity). We illustrate these points by examining two domains—career choices and relationship choices.

### *Regulating Motivation in Academic Majors and Careers*

In a large-scale ethnographic study of students majoring in the fields of science, math, and engineering (SME), Seymour and Hewitt (1997) found that most students reported multiple reasons for choosing their major, and the most common reasons included intrinsic interest, active influence of others, pragmatism and materialism, ability in high school, uninformed choice, and means to a desired end. These authors also found some important differences between students who eventually switched out of these majors and those who did not. Specifically, "nonswitchers" were more than twice as likely as "switchers" to spontaneously report interest as a reason why they initially chose their major. In contrast, switchers were more likely than nonswitchers to report initial reasons associated with goals-defined motivation, including active influence of others, pragmatism and materialism, and ability. Among the students who switched from SME majors, Seymour and Hewitt (1997) found that the top two reasons for switching were a lack or loss of interest in their major and the belief that a non-SME major holds more interest. Importantly, they also found no differences in grade point average between switchers and nonswitchers. Thus, although there is individual variability in the reasons why people choose a major, there are motivational implications to this variability such that some reasons (i.e., that are in line with the expectation or actual experience of interest) seem to be more strongly related to persisting than others.

Other research also supports the important role of interest in predicting persistence in a career track. For example, longitudinal classroom data suggests that interest, but not grades, predicted whether college students took additional courses in a topic (Harackiewicz, Barron, Tauer, Carter, & Elliot, 2002). Research from organizational settings has found that, over the longer term, boredom on repetitive jobs is associated

with dissatisfaction (Caplan, Cobb, French, Harrison, & Pinneau, 1975) and absenteeism (Saito, Kishida, Endo, & Saito, 1972).

This brief review suggests that when considering long-term career choices the role of interest and its regulation may be more salient than when just considering initial choices. For this reason it is important to understand how characteristic differences in goals and strategies interact with the changing context over time to foster interest, and/or whether the changing context allows the regulation of interest in ways congruent with the individuals' characteristic goals and strategies. Opting out because of a lack of interest may be adaptive. However, the lack of interest may be due to contextual features that are not a necessary part of the activity. For example, individuals characteristically oriented toward others (e.g., women and individuals from collectivistic cultures) may expect and find that the typical math and physical science context limits social interactions, even though it may not need to (Morgan et al., 2001). Moreover, when competence-based stereotypes exist (as they do with women doing math and science), unfair feedback or just the knowledge of the stereotype itself can cause lower interest (Smith, Sansone, et al., 2007; Thoman & Sansone, 2009). As a result, individuals may come to see themselves as "not a math person" even when they feel competent, turning the lack of interest they experienced when doing the activity into a personal characteristic that becomes a stable part of their self-concept (Seymour & Hewitt, 1997; Major, Spencer, Schmader, Wolfe, & Crocker, 1998).

### *Regulating Motivation in Interpersonal Relationships*

Engaging in new relationships is often associated with reported emotional experiences similar to our definition of interest (Guerrero & Anderson, 2000), but evidence of an association between engaging interpersonal relationships and experiencing interest comes mostly from research on boredom. Loneliness is reported as one of the major reasons for feeling bored, whereas socializing is reported as one of the prominent techniques for coping with boredom (Harris, 2000), and individual differences in boredom proneness is associated with being less sociable (Leong & Schneller, 1993). Thus we suggest that positive interpersonal relationships are associated with interest, and regular experiences of interest are necessary for sustaining motivation for long-term relationships.

Personality and individual differences can affect the general types of interpersonal situations we seek and find interesting, as well as our choice of specific partners that we expect to find interesting. For example, the work by Isaac et al. (1999) showed that although individuals both higher and lower in interpersonal orientation found the experience of working on a task with an ostensible peer present to be more interesting than when working alone, this interest was only related to future likelihood of engaging in a similar activity for individuals higher in interpersonal orientation. The research by Smith and Ruiz (2007) discussed previously further indicated that individuals found working with partners whose style of interpersonal interaction was

incongruent with their own style to be stressful and uncomfortable. Thus initial choices of whether and with whom to initiate relationships appear to be guided at least to some extent by the anticipated experience.

Moreover, once a relationship begins, certain activities within the relationship seem more associated with experiencing interest than others. For example, ratings of relationship quality in close romantic relationships was much more strongly associated with intensely interactive and exciting activities than with passive, parallel, or other shared activities that are simply done in the presence of the relationship partner (Reissman, Aron, & Bergen, 1993). The personality of both partners can thus influence the degree of interest experienced within the relationship as a function of whether the kinds of activities that each person finds interesting matches with the other. If partners have no shared interests in intensely interactive activities, the relationship will not be likely to accrue the positive motivational benefits associated with these shared interests.

Even if relationships begin with shared interests, research demonstrates a decline in relationship satisfaction after the early relationship years (e.g., Locke & Wallace, 1959; Tucker & Aron, 1993), and this drop in satisfaction has been attributed to habituation and lower arousal (e.g., Aron & Aron, 1986). Relationship boredom after the initial "honeymoon period" is among the most commonly cited reason for divorce (Gigy & Kelly, 1992). In this case, couples are faced with a choice to either quit the relationship or find ways to maintain their motivation and keep the relationship intact.

One proposed solution to the observed decline in relationship satisfaction after the first few years has been for couples to regulate motivation by having them increase shared participation in interesting activities (Aron, Norman, & Aron, 2001). Several empirical studies by Aron, Aron, and colleagues support the effectiveness of this motivation regulation strategy for couples, using diverse methodologies from reports of everyday life and experimental studies (see Aron et al., 2001, for review). Across these studies, Aron, Aron, and colleagues find that couples report greater marriage satisfaction when they engage in more active shared activities and that this effect is mediated by decreasing relationship boredom. Experimental evidence, both in the lab and in randomly assigned relationship interventions, also supports this finding. Across these studies, couples who were given novel and exciting activities to work on together reported greater relationship satisfaction than couples who were given more mundane activities, and this finding was again mediated by decreased perceptions of the relationship as boring (Aron et al., 2001).

Although maintaining interpersonal relationships requires a complex combination of goal commitment, values, emotions, ability to resolve conflicts, and so on, we suggest that motivation based on the experience of interest is also important. In fact, being able to regulate interest within the relationship after the initial interest wanes appears to be an important and perhaps overlooked factor in the maintenance of relationships, particularly relationships that are associated with greater physical and psychological health (Cramer, 1998). Because the context in close relationships is mutually created and defined (Hardin & Higgins, 1996), and activity choices can be influenced by the other person's reactions (Thoman et al., 2007), what we discussed

previously as individual variability in the self-regulatory process may in fact become systematic patterns that encompass the combined variability of both partners as it emerges within the interdependent relationship over time (Zayas, Shoda, & Ayduk, 2002).

## Multiple Individual Differences in Motivation, but One Process?

Based on our self-regulatory framework, we believe that attempts to categorize individuals along a single motivation dimension will necessarily omit crucial pieces of the human motivation puzzle. Instead, we believe that there are multiple individual differences that may play out along the self-regulation of motivation process, and that a particular individual difference may even have opposing effects at different points in the process (e.g., characteristic values that make a person care more about the task may make the experience more interesting initially but may mean that negative competence feedback later in the process has a more devastating effect). Implicit in our discussion is the idea that the self-regulatory framework is common to most if not all people. Rather than proposing stable individual differences in "motivation," therefore, we conceptualize individual differences in terms of providing different inputs into the process and as differentially moderating the relationships among the variables within the process.

This framework has a number of interesting implications that suggest directions for future research. For example, although we have talked about the self-regulation process using language that suggests conscious awareness, as with other self-regulatory processes, this does not mean that individuals necessarily articulate each step in the process prior to acting. Furthermore, behaviors that began as strategies to promote motivation may come to be routinely performed in similar situations, such that they become habits rather than strategies (Ouellette & Wood, 1998). For example, individuals who are more interpersonally oriented may initially choose to work with another person in order to make an activity experience more interesting, and then over time come to make working with others a routine part of doing the activity without regard to motivational impact.

Even if these behaviors are no longer intentional, however, they may still impact motivation. One implication then is that without individuals being aware of it, their actions could continue to promote or detract from goals-defined and experience-defined motivation. For example, individuals who initially chose to work with others on an activity because it made it more interesting might continue to work with others even when the interactions no longer promote interest (e.g., because the interactions have become stressful). In this case, unless individuals become aware that their habitual way of performing the activity is not required, they may start to avoid the activity, quit early, and so on.

Another direction for future research involves questions of development. Although we have proposed that goals-defined and experienced-defined motivation (and their relation) are important for everyone, we do not know how this develops, or if it develops in the same way for everyone. For example, does the ability to regulate goals-defined and experience-defined motivation develop concurrently? Or does one precede the other? What early experiences influence these developmental trajectories, and how might more stable individual differences in temperament or traits influence the kinds of early experiences we have? Developmental questions may continue to be important across the life span. For example, does the weight we place on one or the other kind of motivation change across development? That is, as we get older, might the goals-defined motivation become less important (Kanfer & Ackerman, 2004), because our time frame changes (e.g., Carstensen, Fung, & Charles, 2003), or because we learn that experiencing interest while we work provides greater meaning to our lives (e.g., Maehr, 1984)?

These developmental questions might also be moderated by culture (whether nation-based, ethnicity-based, gender-based, etc.). For example, the Protestant work ethic that characterizes the larger American culture places great emphasis on achieving outcomes (e.g., success, wealth, beauty, slimness), with the result that goals-defined motivation may be especially salient (e.g., Spence, 1985). This greater salience may mean that goals-defined motivation is more important in explaining motivational differences within American culture—or, at least, that it is seen as such. The cultural salience of goals-defined motivation may help explain why previous research has focused primarily on differences in the expectancy-value parts of the model to explain apparent differences in "motivation" as a function of age, gender, or culture and ethnicity (e.g., Eccles et al., 1984; Graham, Taylor, & Hudley, 1998, Smith, Kausar, & Holt-Lunstad, 2007). Although the goals-defined motivational components are clearly important, our review of how the experience of interest (or its lack) may become more critical over the longer term suggests that the focus on goals-defined motivation at the exclusion of experience-defined motivation may be short-sighted. When trying to understand group-level differences in "motivation," therefore, the emphasis on goals-defined motivation may obscure some critical components of the process.

## Conclusion

Despite Lou Holtz's advice to eliminate the unmotivated, by definition motivation is not a stable phenomenon. It varies within a person over time and situations, and its existence can only be inferred through indirect measures such as choices made among alternatives, the amount of effort displayed or reported, or the degree to which an individual persists on a task in the face of obstacles. The ephemeral quality of motivation makes it difficult to predict the variability within a given person, and even more difficult to understand the variability across individuals. Rather than attempt to

identify individual differences in the triggers of motivation, we have described a systematic motivational *process* that is embedded within our attempts to regulate ourselves (and others) over time. Drawing together different research literatures, this conceptual framework provides insight into how a person's motivation to engage in a particular activity may wax and wane over time, and across situations. By conceptualizing motivation in terms of a self-regulatory process, therefore, we offer an organizing framework for understanding the influence of numerous individual differences over time and contexts. Although the research to date supports this framework, further research is clearly needed to more fully identify the parameters of the process. Moreover, additional research is needed to explore the potential for effective interventions according to this framework when "motivation" (too much or too little) becomes a problem.

## Note

1 For the purposes of this chapter we have focused on outcome goals. However, individuals may also begin an activity with "process" goals (e.g., to have an interesting or fun experience), and research on motivational orientations suggests that some individuals may be more likely to characteristically approach activities with these process goals (Amabile, Hill, Hennessey, & Tighe, 1994; Ryan and Connell, 1989). From our perspective the self-regulatory process is the same. That is, there is still motivation associated with the initial goals (in this case, motivation to have a particular kind of experience) and motivation that arises from the actual experience once engaged in the task. When the experience *is* interesting, then both sources of motivation are compatible. If individuals are mistaken in their expectations about the task or become satiated after doing the task for a while, however, the motivation based on the experience will be in conflict with initial goals, and individuals will then face the same choice about whether to quit or persist (and under what conditions) that they do when the initial goals are outcome goals. Furthermore, although we have included the "extrinsic" and "intrinsic" labels to help connect to previous research, our perspective suggests that attempting to define motivation in terms of whether the goal of engagement is "intrinsic" or "extrinsic" to an activity is difficult because the activity definition is fluid and can change over times, contexts, and people. We thus prefer to make the distinction in terms of goals-defined or experience-defined motivation, with the knowledge that this distinction often, but not always, maps onto the traditional "extrinsic" and "intrinsic" motivation distinction.

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# 10

# *Goal Systems and Self-Regulation*

## An Individual Differences Perspective

**Paul Karoly**

### A Definitional and Metatheoretical Prologue

As a clinical psychologist who relies upon motivational constructs as epistemic guides, I have mainly focused my recent conceptual and empirical efforts on examining the multileveled processes underlying human self-regulation, particularly as they manifest in the domains of psychopathology and health. Unfortunately, the self-regulation concept has become so popular in recent years and its reach so widely extended that it is increasingly difficult for those new to the field to establish an analytic foothold. Although crediting the self-regulation literature with being unusually broad and vital (cf. Hoyle, 2006) is an accurate assessment, it is also fair to describe much of the research as being plagued by interpretive issues pertaining to:

> theoretical incompatibilities, redundancies of factors given different names, fractionation of the facets of higher-order constructs into seemingly different determinants, evaluation of the unique contributions of factors when tested in concert rather than singly, and the model of theory building that is adopted. (Bandura, 2005, p. 247)

Theoretical incompleteness and vagueness regarding the relationship among putative components of the regulatory process are further concerns. To the extent that the issues confronting self-regulation research are mirrored in the larger field of personality (Cervone, Shadel, Smith, & Fiori, 2006; Little, 2006), the task of bringing the two domains into alignment is indeed daunting. Nonetheless, my purpose in this chapter will be to illustrate, from an individual differences perspective, how my colleagues and I have attempted to address the ways that people's goal-related appraisals influence their efforts to engage in *self-regulation*—that is, how they navigate sequential "possibility spaces"

(the joint product of their goal systems, regulatory appraisals, executive and expressive competencies, belief and knowledge systems, memories, and arousal/emotion processes, in concert with sociocultural, biological, and contextual constraints and affordances).

As goal-centered self-regulation is a complex, unfolding process, the topic of *individuality* has been approached from diverse vantages. For example, developmentally oriented investigators have typically addressed differences in regulatory temperament(s), citing such dimensions as effortful control (which includes the abilities to inhibit dominant responses and to focus attention) and cardiac vagal tone (indexed as parasympathetically mediated heart rate variability) (Porges, 2007; Rothbart, 2007). Alternatively, trait theorists have, for their part, examined a number of self- and other-ascribed action tendencies that are presumed to reflect the conditional probability that a certain category of behaviors is likely to occur in a certain category of situations (in the present case, situations pressing for goal-directed thoughts, feelings, or actions) (see Matthews, Deary, and Whiteman, 2003; Mischel & Shoda, 1995). Thus investigators interested in trait or dispositional self-regulation have focused on such presumably stable self-directional elements as conscientiousness, goal setting, goal commitment, planning, and the like (e.g., Hong & O'Neill, 2001; Klein, Wesson, Hollenbeck, Wright, & DeShon, 2001; Martinez-Pons, 2000; Neal & Carey, 2005).

Notwithstanding the current trend toward defining self-regulation within a particular paradigm or analytic level, I offer the following working definitions not only to provide readers ready access to my metatheoretical precommitments, but also because I believe the two definitions are relatively nonpartisan, with the potential to cut across the varied models articulated in this handbook.

*Self-regulation type 1* refers to the temporally extended process of moving toward or away from self-relevant goals in a relatively flexible and situationally coordinated manner, under conditions of transition, threat, error, conflict, or complexity/uncertainty.

By contrast, *self-regulation type 2* refers to the short-term process of moving toward or away from self-relevant goals in a relatively inflexible and situationally primed manner under relatively predictable, controllable, routine, and/or stable conditions.

Type 1 self-regulation deals with people's self-reflective attempts to travel from point A to point B, to navigate in a world of possibilities, when certain constraints (contextual demands, stresses, or limiting factors) are operating. Type 1 self-regulation is regulation *by* the self. Type 2 self-regulation has been variously called *automatic*, *implicit*, *associative*, *subsymbolic*, or *nonconscious* processing, and is also known as *physiological self-regulation* (wherein its temporal course is continuous rather than short term). Consequently, what I am here calling type 2 self-regulation might be thought of as regulation *of* the self.

In this chapter, when I discuss the goal-guided process of self-regulation, I will be referring primarily to type 1 self-regulation. However, readers should not assume that these two forms represent conceptual opposites or antagonistic systems. Instead, self-regulation type 1 and type 2 are best viewed as interdependent levels within a hierarchical system of control through which evolution has equipped humans to attain

their desires and to adapt (both consciously and nonconsciously) to the contingencies of an unpredictable world. Also, from a systems point of view, it would be a mistake to position self-regulation of either type against external regulation. Despite the frequent use of dichotomies such as internal–external, intrinsic–extrinsic, self–other, freely chosen versus dictated, and even top-down versus bottom-up in the contemporary motivation literature, there exists no ontological separatrix between persons, contexts (settings, cultures, social transactions), and time that justifies our proclaiming that a goal or its supportive structures operate solely or mainly within a particular spatial locus (either in the world or inside our heads). Instead, goals are the product of a complex, multidirectional, and changing person–setting dynamic (see Bandura, 1986, Klinger, 2006; Toates, 2006).[1] The epistemic culprits here may be the qualifier *self* in the term *self-regulation* and the pervasive tendency to adopt an "either–or" attitude about so many aspects of the human condition. Finally, in defining self-regulation type 1 as *relatively flexible* and type 2 as *relatively inflexible*, I hope to forestall the presumption that the two systems must operate either entirely from the top down or from the bottom up, and reinforce again the idea of system interdependence. For just as nonconsciously activated goals can be facilitated by higher order processes, so too can self-reflective goals be aided by habits (see Hassin, 2005; Wood & Neal, 2007).

Therefore, in the tradition of cognitive, cognitive social, and control theory models (Bandura, 1986; Barone, Maddux & Snyder, 1997; Cooper & Shallice, 2006; Ford, 1987; Karoly, 1993b; Mischel, & Shoda, 1995; Powers, 1973), self-regulation is broadly viewed (across both types 1 and 2) as a multicomponent, hierarchically organized process of long- and short-term goal pursuit that targets for modulation (change as well as maintenance) a number of core psychological components including attention, action, affect and emotionality, thought and imagery, physiological responses, and animate and inanimate aspects of the environment. For present purposes, I also wish to emphasize that: (a) a useful, mechanism-based explanation of any regulatory target necessitates a conception of the self-regulation process as comprising mutually influential component entities whose nature and function can and should be assessed at different analytic levels, and (b) that goals serve as pivotal regulatory components that both act upon and are acted on by the other constituents of the system, including the environment, bodily events, emotions, memories, higher order competencies, and time. Goals are nothing less than the focal point or psychological conduit that fosters what Nuttin (1984) called the "personalization of motivation." Although relatively noncontroversial, the operational specifics of these assumptions remain to be fully delineated (Karoly, Boekaerts, & Maes, 2005).

## The Goal Construct: Ubiquitous, But Underspecified

Few would argue with the notion that goals lie at the heart of the self-regulation construct, and numerous commentators have, over the years, asserted the overarching

adaptive significance of goals and goal-like constructs (such as intentions, motives, urges, cravings, and desires). Here is a small sampling:

- ". . . successful pursuit of goals is not just the most important thing in the life of humans and other animals; it is ultimately the only thing that counts toward survival, life's bottom line" (Klinger & Cox, 2004, p. 3);
- "Developmental psychologists have begun to conceive of development as involving a succession of goals or goal structures over the lifespan" (Dweck, 1996, p. 358);
- ". . . a great deal of man's behavior cannot be explained except by reference to persistent 'self-stimulation' in accordance with a plan of action, which often involves the subject's commitment to a distal goal or set of goals" (Murray, 1959, p. 34);
- "Goals provide the structure that defines people's lives. Moreover, goals can be dynamic—not simply end points to be attained but paths to be negotiated" (Carver, Lawrence, & Scheier, 1996, p. 12).

And, notably:

- "Creating propositions about goals and the methods for researching them has been a growth industry for intrepid social cognitive psychologists" (Barone, Maddux, & Snyder, 1997, p. 156).

Therefore, in view of the acknowledged centrality of goals to the unfolding of self-regulatory processes (with movement toward or away from goals being the only common element in the twin definitions noted above), my colleagues and I have been attempting to explore and "unpack" the goal construct for a number of years. Our efforts to understand goals systematically have been guided by an emerging, metatheoretical framework called *Goal, Self-Regulatory, Automatized, Social Systems Psychology (GRASSP)*, a terrain map that acknowledges two types of self-regulation, the role of time, the importance of context, and the need to pursue system dynamics from diverse analytic levels (including the developmental, trait, evolutionary, interpersonal, and neurochemical/physiological levels). In the present chapter, I shall mainly illustrate how my colleagues and I have sought to appraise goals at the *mental representational* (cognitive) and *functional/ecological* (real time, adaptive transaction-focused) levels.

## *Goal Characteristics and Dimensions: The Usual Suspects*

Following Kruglanski (1996), we can consider any goal to be a "knowledge category whose generic definition is 'a desirable future state of affairs one intends to attain through action' " (p. 600).[2] Although goals are only a part of a larger self-regulatory process, their pivotal role nevertheless marks them as worthy of in-depth analysis in their own right. Toward that end, the pioneering goal-centered research programs of Little (Little,

Salmela-Aro, & Phillips, 2007), Klinger (1977, 2006), and Emmons (1999) are notable for their systematic delineation and multidimensional assessment of goals (alternatively termed *personal projects*, *current concerns*, and *personal strivings* respectively) and their linkages to various psychosocial and physical health outcomes. Despite the proliferation of goal dimensions (Austin & Vancouver, 1996), the majority of contemporary assessments have tended to focus on three aspects of goals: their *content* (types of self-rated or judge-defined aspirational targets), *goal topography* (people's implicit and explicit appraisals of the key descriptive features of their aspirational targets), and/or *goal structures* (derived indices reflecting the patterned relations between descriptive appraisals, including such constructs as goal conflict, goal interconnectedness, and meaning saturation) (see Karoly, 1999; Shah, Kruglanski, & Friedman, 2003).

A goal's content or categorical type (sometimes captured as a particular style or "goal orientation") has repeatedly evidenced psychological and physical health implications (DeShon & Gillespie, 2005; Emmons, 1999; Klinger, 1977; Little, 1983; Pervin, 1989). Karoly and Lecci (1993), for example, found that college-age women admitting to a preoccupation with physical illness tended to report more physical health goals than their normal peers and, although academic and social goals ranked one and two for normal college women, the hypochondriacal women ranked health goals as their second most important life pursuit. Similarly, Hamilton, Karoly, and Zautra (2005) identified individual differences in the patterns of endorsement of symptom-specific goals among women with fibromyalgia syndrome (FMS), a disorder involving diffuse pain in the absence of any clearly discernible systemic illness. Rather than inquiring about goals in general, the investigators created a list that captured common issues reported by persons with FMS, including symptom reduction, traditional treatment seeking, alternative treatment seeking, self-sufficiency, and social validation. Participants were asked to rank order their goals from a list of 12. Cluster analyses revealed three relatively homogeneous subgroups of FMS goals and, importantly, that the goal profiles were associated with indices of psychosocial adjustment. For example, women who ranked self-sufficiency goals at the top of their hierarchy reported less severe FMS symptoms and a more supportive social environment. By contrast, women favoring a social validation goal tended to report more social interference with the pursuit of their intentions.

Indices of adjustment have also been linked to the pattern of evaluative ratings that are idiographically elicited with respect to particular goals or goal types. Starting with the premise that unfulfilled or unattainable goals (life regrets) hold special significance for psychological adjustment, Lecci, Okun, and Karoly (1994) sought to compare the topographic (goal evaluation) patterns of life regrets and current goals and to assess the implications of these patterns for adjustment. With reference to dimensions including perceived importance, distress, difficulty, progress, control, disappointment, impact, hindrance, others' view of importance, desirability, conflict, investment, and outcome, regrets and current goals tended to elicit different evaluative ratings. Not surprisingly, current goals were seen as more salient (evoking higher ratings) along all dimensions, with the exception that regrets garnered higher ratings of hindrance.

Interestingly, after controlling for the effects of negative affectivity, the regret dimensions of perceived difficulty, investment, progress, and the current goal dimension of conflict accounted for over 14% of the variance in current life satisfaction.

Clearly, important contributions have emanated from research centering on goal content, goal topography, and goal structure (see Austin & Vancouver, 1996 for a review). However, without diminishing the value of these three assessment stalwarts, I hope to convey to readers in the remainder of this chapter the conceptual and empirical potential of several relatively underutilized dimensions.

## Construing the Journey: Goal Process Representation and the GSAB

Goal process representation refers to a relatively stable mental map (action schema, scenario, or script) of an actor's intended journey from initial intention to goal attainment. It denotes ways of thinking, not just about the goal per se, but about the anticipated goal trajectory and its varied functional components. Process representations are a means whereby goals are propositionally specified, stored, organized, evaluated, and (if need be) reconstructed.

To assess goal process representations, my colleagues and I developed the *Goal Systems Assessment Battery* (GSAB; Karoly & Ruehlman, 1995),[3] a self-report instrument designed to gauge the major functional components or "governing functions" of self-regulation as outlined by Ford (1987). Respondents are asked to select a personal goal (often stipulated to be an easily identified type of goal—such as social or academic) and then reply to a series of Likert-type items. The two GSAB *directive function* subscales tap what Ford (1987) considered the command, set point, or feed-forward aspect of a self-regulating system, indexing the framing of a goal in terms of its *value* and *self-efficacy*. The *regulatory function*, gauging the comparator (monitoring and standard matching) component of self-directedness, is assessed by two subscales: *social comparison* and *self-monitoring*. The *control function* deals with the feedback-sensitive, self-correcting (discrepancy or error-reducing) component of the system. The control function is assessed via three subscales: *planning*, *self-reward*, and *self-criticism*. Finally, as Ford (1987) stresses the importance of an energy source within any fully operational living system, we included in the GSAB an *arousal function*, indicated by two subscales: *positive* and *negative arousal*. The GSAB has demonstrated strong psychometric properties, yielding high internal consistency and good retest reliability as well as good construct validity across several populations. In addition, confirmatory factor analyses have shown that the 36-item GSAB has a consistent factor structure across different content domains (e.g., social, health-related, and academic goals). It is also worth noting that the directive and control function scales are roughly equivalent to two brief instruments assessing what has been labeled the *will* (*agency*) and the *ways*, facets of a popular construct called *hope* (see Snyder, 1994).

After establishing the psychometric properties of the GSAB (Karoly & Ruehlman, 1995), we set out to explore its utility as a motivational frame for various clinical and health-related topics. I shall highlight four of these topics next.

### *Psychopathology*

In an early demonstration of the implications of goal process representation for appraising DSM-relevant syndromes, Craig Newton, Lisa Burrows, and I administered the full, 36-item GSAB to a large group of college students with instructions to rate a social (intimacy) goal (Karoly, Newton, & Burrows, 1995). The participants also completed a scale assessing social anxiety/social phobia; and they were subsequently partitioned into those with high, medium, and low scores. As depicted in Figure 10.1, the three groups differed in their sense of self-efficacy, planning, self-criticism, and positive and negative arousal, supporting (but only in a cross-sectional manner) the expectation that the goal pursuit scripts of socially anxious persons reflect the kinds of motivational dysfunction that could help account for the maintenance of their disorder.

Making use of a random-digit dialing telephone-recruitment and interview format, Lecci, Karoly, Ruehlman, and Lanyon (1996) set out to replicate Karoly and Lecci's (1993) college student findings (see above) concerning the incidence of health goal endorsement among persons with an abnormal illness preoccupation (aka hypochondriacs)

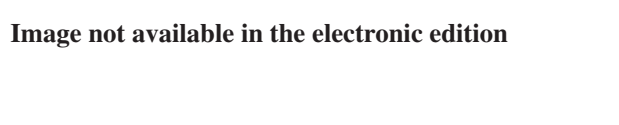


**Figure 10.1.** GSAB scores of high, medium, and low social anxiety groups.

as well as to examine the pattern of goal process representation among a national sample of male and female hypochondriacal adults (mean age = 42.6 years). The previous patterns of health goal endorsement were replicated in this more representative sample and, by using the GSAB, the investigators were able to demonstrate a unique relation between goal process cognition and hypochondriacal tendencies after controlling for demographic and comorbidity factors. More specifically, participants' endorsement of illness symptoms was assessed via a 75-item symptom checklist, their hypochondriacal tendencies by the Whitely Index (Pilowsky, 1967), their psychological status by a measure of depression, and their self-reported chronic illness status via an illness checklist. Using a multiple regression analysis with Whitely scores as the criterion, it was discovered that whereas symptom endorsement, chronic illness diagnoses, and depression accounted for a fairly large proportion of variance in hypochondriasis (19%), two scales of the GSAB (*social comparison* and *negative arousal*) stepped into the equation, contributing an additional 11%. Clinical investigators have, over the years, suggested a number of etiological pathways for hypochondriasis, including deviant health beliefs and social reinforcement of the sick role. The Lecci et al. (1996) study helped establish a role for motivational factors in the form of goal process representation.

In a follow-up study, Lecci and Cohen (2004) sought to further clarify the nature of abnormal illness concerns, which are often postulated to be driven by a tendency to misinterpret bodily sensations. The body-centered component of hypochondriasis is hypothesized to be a heightened perceptual sensitivity to illness-related stimuli, operating at an implicit or nonconscious level, along with a tendency to amplify bodily signals. But Lecci and Cohen also postulated a self-reflective, goal-driven component. That is, they proposed that persons predisposed to worry about illness may tend to: (a) formulate illness-avoidance (prevention) goals, and (b) construe their goals in a manner so as to experience them as aversive and independent of volition. Consequently, these investigators assessed goal content and goal process representation (via the GSAB). To examine the automatic nature of illness concerns, Lecci and Cohen made use of a modified emotional Stroop task wherein participants were shown illness and nonillness words flashed on a computer screen in one of five different colors. On each experimental trial, the subjects were first presented a target color (the name of the color to watch for, printed in white ink) followed either by an illness or nonillness word printed in the target color. The dependent measure was the participant's reaction time in making a color-based match or nonmatch response. It was hypothesized that reaction times to illness words would be longer (i.e., slower) than reaction times to neutral words for individuals with an activated illness concern. In other words, the illness words were expected to interfere with the required color matching for those with an elevated degree of illness worry (hypochondriasis). Slowed reaction time is, interestingly, a form of self-regulatory deficit in the sense that it reflects an inability to inhibit the "prepotent response" of ruminating over illness-related stimuli. In addition, to heighten participants' sensitivity to illness words (to activate illness concern), half were randomly assigned to take part in a so-called blood pressure measurement

that involved the receipt of a bogus negative reading (the illness concern induction) prior to the Stroop test.

For present purposes, the most relevant findings of this set of studies are that (a) goal process representation (for health and nonhealth goals) as assessed by the GSAB was strongly related to measures of nonnormative illness preoccupation and fear, even after controlling for the effect of preexisting chronic illness and for effects of the bogus blood pressure feedback; (b) as predicted, the negative arousal subscale of the GSAB was consistently related to measures of abnormal illness belief (as was the self-criticism subscale)—suggestive of goal-based schematic negativity; (c) participants who received the experimentally induced illness concern induction tended to view their health goals as involving illness prevention; and (d) as predicted, the directive function (GSAB-assessed *value* and *self-efficacy*) was not correlated with illness preoccupation tendencies, a finding that the authors believe lends support to the automatic perceptual sensitivity view of hypochondriasis.

### *Chronic Pain*

Although clinical interventions sometimes seek to empower persons with pain via the strengthening of self-regulatory skills (Jensen, Nielson, & Kerns, 2003), comparatively less attention has been paid to the causal reciprocality of aversive somatic experience, emotionality, and basic self-regulatory processes (see Hamilton, Karoly, & Kitzman, 2004). The GRASSP perspective asserts that ineffective self-regulatory dynamics (including goal cognition) can serve as causal or maintenance components underlying many pain disorders (and, contrariwise, that effective regulatory system functioning offers a foundation for pain resilience) (cf. Karoly & Ruehlman, 2006). Thus the pain sufferer is viewed not as the passive bearer of noxious sensory stimulation, but as an active agent whose mental representations of the pain experience can either alleviate or exacerbate the thoughts, moods, and physiological reactions with which the experience is associated. Consequently, in several studies, the GSAB has been used to illuminate the goal process representations of persons with chronic pain.

Karoly and Ruehlman (1996), for example, recruited a national sample of adults working in management positions and interviewed them about their current pain, their work-related goals, and their psychological status (depression and anxiety). Also assessed was intergoal conflict. That is, participants were asked to nominate their two most important work goals and rate the degree to which they conflicted with one another on a 1 (*not at all*) to 5 (*a great deal*) scale. In addition, participants nominated their single most important nonwork goal and rated its degree of conflict with the two most important work goals (using the same 1 to 5 scale). The averaged ratings served as an index of perceived work–nonwork conflict.

This research was founded on several premises. First, it was hypothesized that persons living with persistent pain tend to develop dysfunctional schemata not only about their pain, but also about the process of pursuing meaningful life goals in the face of

pain (Karoly & Jensen, 1987). Moreover, the style of goal process representation that emerges among persons with pain is expected to predict various indices of physical and mental health, with goal cognition serving as a bridging factor between life stress and adjustment.

I shall highlight two findings from the Karoly and Ruehlman (1996) study. First, pain experience, in a nonclinic sample of working adults, was associated with a negative pattern of work goal construal that contrasted with the work goal construal patterns of persons not in pain. Three groups of participants were in fact identified: participants reporting no pain over a 6-month period, those reporting episodic pain (not consistent over a 6-month period), and those reporting persistent pain for at least 6 months. Comparing the three groups on their GSAB subscale responses and indices of conflict revealed that the two pain groups differed from the nonpain workers in their lower levels of goal value, goal self-efficacy, and goal-relevant positive arousal and higher levels of self-criticism and negative arousal associated with their vocational goals. Moreover, persons reporting persistent pain differed from the nonpain participants and from the episodic pain group in their significantly greater level of perceived conflict between work and nonwork goals.

Second, in examining the links between pain, goals, and psychological distress, the authors were able to use the GSAB to account for variance in both anxiety and depression after controlling for group membership (i.e., persistent, episodic, or no pain). Whereas the pain group designation accounted for 8% of the variance in anxiety (an $r$ of .30 reflecting the usual zero order correlation between pain and psychological outcomes), the block of GSAB subscale scores enhanced the adjusted $r^2$ from .08 to .23. An examination of the beta weights revealed that goal-based self-criticism and negative arousal along with work–nonwork conflict were the key motivational constructs that helped clarify the anxiety construct in this population. As for depression, a similar pattern emerged, with the block of goal variables bringing the adjusted $r^2$ from .03 to .21. Self-criticism, negative arousal, and (in this instance) positive arousal predicted the depression scores of our sample of white-collar, managerial working adults.

The scales of the GSAB have also proven useful as predictors of real-time pain-related adjustment as assessed by means of daily diaries. The use of experience sampling procedures and hierarchical linear modeling techniques permit investigators to examine between-person individual differences (in levels of goal process representation, for instance) as they might impact the temporal fluctuations (within-person variability) of key aspects of day-to-day adaptation (cf. Bolger, Davis, & Rafaeli, 2003). For example, Affleck et al. (2001) asked 89 women with fibromyalgia to complete individual difference measures prior to embarking on a 30-day self-monitoring program that employed palm-top computers that "interviewed" the participants about progress and interference in the pursuit of meaningful health and social goals. This study was predicated on the assumption that obstacles, such as fatigue and mounting levels of pain, can derail people's efforts to attain even their most valued goals, but that strongly held values and positive expectancies can act as motivational energizers. To assess the "value-expectancy" constructs, Affleck and his colleagues administered

the GSAB *value* scale and the GSAB *self-efficacy* scale to women who answered in terms of their most important social and health goals. Participants also completed a measure of optimism. Thus goal value, goal-based self-efficacy, and dispositional optimism served as the between-person (level 2) variables and were hypothesized to predict daily ratings of effort, progress, the extent of pain- and fatigue-based interference, and levels of felt pain and fatigue. The design permitted the research team to examine "the temporal dynamics of goal activity within a single individual across time, to determine the generalizability of these individual dynamics across persons, and, finally, to locate sources of individual differences in these dynamics" (Affleck et al., 2001, p. 589).

As expected, persons experiencing more severe pain reported greater pain- and fatigue-related barriers to both their health and social goals. However, optimism and goal value were found to play a role in daily pain dynamics in that (a) those who placed greater value on their goals reported expending more daily effort to achieve them as well as more daily progress in actually attaining these goals, (b) those who were most optimistic were less likely to see their day-to-day pain and fatigue as goal barriers. Interestingly, the beneficial effects of goal value on goal effort and goal progress was not attenuated on days that were rated as more or less fatiguing or pain-filled.

### *Exercise*

Patterns of goal process thinking have been usefully explored in the physical exercise domain, partly in an effort to address the perpetual question of why so many people are unable to maintain a regular program of physical activity despite their knowledge that it is the sensible and healthy thing to do. Toward this end, Karoly, Ruehlman, et al. (2005) undertook to examine GSAB-based goal process thinking from the vantage point of what they dubbed a *life space analysis.* That is, they proposed that exercise goals do not function in a motivational vacuum, but are best approached relationally, that is, as fitting into a larger motivational agenda (or life space) that includes other goals whose importance or centrality might well be expected to compete with or overshadow exercise. Consequently, college students were asked to nominate their most important goals in the domains of exercise, academics, social relationships, and family/work life. Following this, they were asked to indicate which of the three non-exercise goals tended to interfere most with exercise. Participants were also asked to indicate their degree of participation in exercise on a scale that went from "currently do not exercise and do not intend to start in the next 6 months" to "currently exercise *some*, but less than 3 times a week for 20 minutes or more" to "currently exercise regularly, 3 times a week or more for 20 minutes or more." The latter two categories yielded what we termed *irregular* and *regular exercisers.*

Data were collected on all nine subscales of the GSAB for the regular and irregular exercisers for their most important exercise goal and their most important interfering goal. It should be noted that referring to one goal as "interfering" tends to obscure the fact that academics, social life, and family/work life constitute key defining tasks

for college age individuals and are expected to take up a great deal of their motivational energy. Hence, so-called "interfering goals" are central components of the life space. Nonetheless, the interaction between exercise regularity (a between-groups factor) and goal type (a within-groups factor) for the nine GSAB subscales was our primary interest; and we made one nonrisky and one risky prediction about the pattern that might emerge. Specifically, we reasoned that the irregular exercisers (those not so strongly committed to exercise) would show stronger self-regulatory process thinking in regard to their "interfering goal" relative to their exercise goal. However, on a more risky level, we hypothesized that the regular exercisers would evidence comparable levels of goal process representation on both their strivings, the exercise and the interfering goal.

Our findings largely confirmed these predictions. The interaction between exercise regularity and goal type was significant ($p < .001$). Table 10.1 shows the means and standard deviations for the nine GSAB subscales for each goal type and each group. Follow-up tests found the interaction effects to be significant for six of the nine GSAB subscales: value, self-monitoring, social comparison, planning, self-reward, and positive arousal. With the exception of positive arousal and self-monitoring, the data generally showed that the regular exercise group was viewing their two goals in a highly similar manner. By contrast, irregular exercisers generally tended to give higher GSAB ratings to their important interfering goal.

A recent study in the exercise domain took a somewhat different approach. Lutz, Karoly, and Okun (2008) administered the GSAB to another large group of university students but this time also asked them to complete a measure of self-determination for strenuous leisure-time exercise. Self-determination theory (SDT) asserts that people are inclined to pursue goals that meet or match their innate needs for competence, autonomy, and relatedness, and further that they vary along a motivational

**Table 10.1** Comparison of GSAB subscales by exercise regularity and goal type

**Table not available in the electronic edition**

continuum that reflects their degree of internalization of what were originally extrinsic or external rules or values (Deci and Ryan, 2000). As already stated, the GSAB emerges from a control theory/social cognitive tradition that emphasizes processes (or the *how*) of self-regulation, in contrast to SDT, which seems focused upon localizing the reasons underlying particular patterns of goal enactment (the *why* of self-regulation). Although the two approaches are not antagonistic or incompatible, they have rarely been applied in tandem toward clarifying the nature of exercise motivation. As a number of investigations have demonstrated the predictive power of SDT in the exercise arena, we were confident that a measure of self-determined exercise motivation would account for meaningful variance in exercise participation. However, in light of the process-oriented nature of the GSAB, we further hypothesized that goal process cognition (as reflected in the nine scales of the GSAB) would serve to mediate the relation between strength of self-determination and leisure time exercise in college age participants. Thus a group of undergraduate students completed the GSAB, the Exercise Motivation Scale (Li, 1999), and the Leisure-Time Exercise Questionnaire (Godin & Shepard, 1985).

The findings of this study confirmed our mediational hypothesis, and the results are illustrated in Figure 10.2. The total effect of self-determination ratings on the frequency of strenuous exercise (0.47) was significant. However, the direct effect of self-determination on exercise frequency (0.13) was not statistically reliable. As the figure shows, self-determination for exercise was related to all the subscales of the GSAB with the exception of social comparison and self-criticism. Among the goal process representation variables, self-monitoring, planning, and positive arousal yielded significant direct effects on exercise frequency. Of the nine indirect effects, three (self-monitoring, planning, and positive arousal) were significant. Overall, the multiple mediator model was significant ($p < .0001$), and accounted for 21% of the variance in strenuous exercise frequency. The findings suggest that goal-based self-monitoring, planning, and positive arousal might serve as potentially powerful intervention targets for those seeking to improve exercise behavior in young adults.

### *Academic Performance*

The manner in which college students frame their school-related achievement strivings has been an active domain of research in educational psychology for several decades (Covington, 2000; Elliot & McGregor, 2001). Because any academic pursuit requires not only the representation of the hoped-for destination, but regulatory process cognition as well, Okun, Fairholme, Karoly, Ruehlman, and Newton (2006) set out to investigate the relation between goal types, goal process thinking, and a relevant index of goal attainment, exam performance. In light of inconsistencies that have arisen in labeling patterns of students' goals when a priori models are used to classify them (in contrast to the use of sample-specific goal categorizations), the investigators also sought to create a classification scheme for student-generated "most important" academic goals.

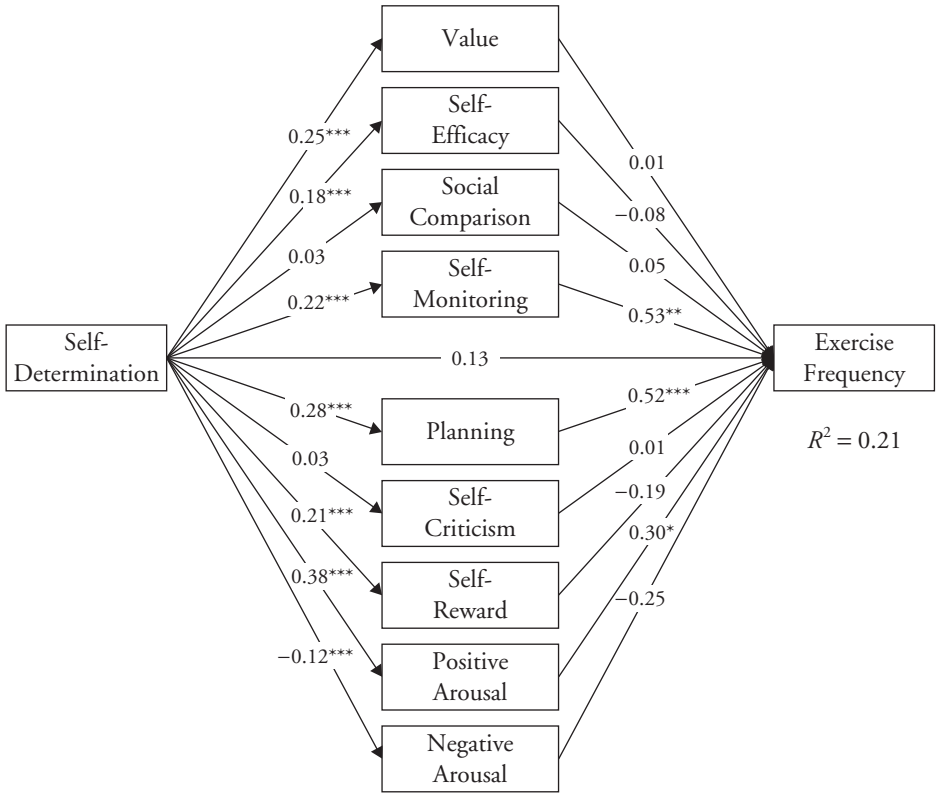


**Figure 10.2.** Coefficients representing effects of self-determination index on goal process mediators and strenuous exercise. $^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$.

Students were given a definition of an "academic goal" (a learning outcome that could be achieved within a semester), asked to think about all their academic goals pertaining to their introductory psychology course, and then to select three as the most important. From the three, each participant nominated his or her single most important goal, and it was this most important goal that was subsequently rated using the 36 items of the GSAB. The most important goal was likewise the one that was coded in accordance with a category system derived from student-generated goals at Arizona State University.

The samples of students tested by Okun and his colleagues tended to report three major goal types: performance, mastery, and study strategy goals. Importantly, the three goal types showed significant effects on GSAB subscale responses. In two separate studies, one involving goals in introductory psychology and one in which the most important goal in another course was also obtained, goal process cognitions were discovered to be differentially affected by goal types. In one study, students with performance-oriented academic goals (i.e., goals centering on attaining or avoiding a particular grade) reported

higher GSAB value scores than those advocating mastery goals (i.e., goals directed at attaining knowledge, skills, or competence). In a second study, students with performance academic goals reported higher self-monitoring scores than those with study strategy goals (i.e., goals having to do with methods for progressing through a course toward an unspecified outcome). Students with performance goals (the most frequently reported goal type) also tended to have higher scores on negative arousal and self-criticism.

The relation among goal types, goal process cognition, and exam performance was perhaps the most central question addressed in the Okun et al. (2006) studies. It was reasoned that differences in goal process representation (GSAB subscale scores) would mediate the relation between goal types and exam performance. To examine this prediction, analyses were conducted in which exam scores were regressed onto dummy-coded goal types followed by the nine GSAB subscale scores. Students tended to perform better on introduction to psychology exams as GSAB value and self-efficacy increased and as positive arousal and negative arousal scores decreased. When GSAB scores were included as step-2 predictors, the mastery academic goal failed to predict exam score variance. The percentage of the total effect of mastery goals on performance that was indirect (operating via the GSAB) was calculated to be 33%. This partial mediation effect, although intriguing, needs to be replicated. Nonetheless, these preliminary findings support the utility of goal process thinking in understanding how distinct goal orientations influence objective learning outcomes.

### *Summary*

In sum, the Goal Systems Assessment Battery (GSAB; Karoly & Ruehlman, 1995), as an index of goal process representation, has proven quite useful across an array of content areas; and it promises to be a motivational assessment tool of value to investigators who may elect to employ it in as yet unstudied domains.

As our work has not been limited to the study of goal process representation (via the GSAB), I turn now to several other goal-related constructs that my colleagues and I have been exploring.

## Regulatory Mutuality

A major obstacle to a fuller appreciation of the systems nature of self-regulation is the prominence afforded the *self* part of the term. Notwithstanding our long-standing language habit, goal guidance should also be viewed transactionally. For example, as a goal content category, social relationship goals, those typically involving friendship and intimacy, have proven to be particularly important for appreciating adjustment-related successes and failures (e.g., Gable, 2006; Sanderson & Karetsky, 2002; Strachman & Gable, 2006). An important facet of goal-related sociality concerns the

mutual setting and mutual control of goals about which two or more persons appear to have a real or presumed "investment" (a process I call *mutual state regulation*). Because goals are seldom enacted in a social vacuum, greater attention to ecological embeddedness, communication processes, interpersonal exchange, person–environment fit, relational schemata, and "social context effects" (Karoly, 1999) is clearly warranted (cf. also Shah, 2006; Vohs & Ciarocco, 2004). Moreover, because interpersonal goal conflicts can be linked to a number of psychological disorders, either as potential causes, correlates, or maintenance factors (Mansell, 2005; McKeeman & Karoly, 1991), it behooves investigators to more fully explore the processes whereby dyads or larger groups of persons seek to achieve mutual state regulation (influencing others as well as themselves for the sake of attaining shared or unshared personal goals).

With the social nature of self-regulation in mind, Okun and Karoly (2007) undertook a study of the links between health behavior change and what was termed *goal ownership*. The study was predicated on the existence of important individual differences in the ways that individuals make strategic relational appraisals about their goals. In fact, an extant conception called the *social contextual model* of everyday problem solving (the SCM; Meegan & Berg, 2001), contends that individuals vary in how they link their goals to the larger social unit. People may see themselves as the "sole owners" of their goals, may see the goals as primarily personal but tending to impact upon others, or may view a goal (or goals) as originating from or inspired by a social source. The three types of goal construal (the solitary, the indirectly shared, and the directly shared) are said to give rise to distinct types of goal pursuit/problem solving strategies: individualism, supportiveness, and collaboration. Notably, the SCM does not consider the possibility that a goal may be construed as imposed by a significant other—neither one's own nor shared. Okun and Karoly (2007) suggested that because investigators of the SCM did not encounter many health-relevant goals, they may have tended to overlook a potential domain in which close friends and family members might attempt to impose lifestyle change goals (e.g., exercising, eating better, safe driving) for the other person's "own good."

Hence a large sample of college students who reported currently being in a dating relationship participated in a survey that assessed (among other things) the health behavior changes that their dating partner wanted them to make during the previous three months, their restatements of the health changes into the form of goals (later coded into 10 types plus an "other" category), their perceptions of "ownership" of the health change goal, broken down into either self-set (an affirmative answer to the item: "It is my goal"), partner-set ("It is my partner's goal), or joint-set ("It is our goal"), and perceptions of regulatory goal cognition as assessed by means of subscales of the Goal and Processes Inventory (GAPI; Maes et al., 2001), an instrument very similar to the GSAB but developed independently in the Netherlands. In addition, participants were asked to report on whether their health behavior had changed toward or away from what their partner wanted or had not changed at all.

Our findings supported the contention that perceived goal ownership would vary among our sample and that it would prove to be predictive of health behavior

change. First, it is worth noting that although partner-set goals were not uncommon (nominated 14% of the time), they occurred less often than self-set (42%) and joint-set goals (44%). Goal ownership was found to be associated with health behavior change such that, among those with joint-set or self-set goals, 80% and 75% respectively reported making positive changes. In contrast, among those with partner-set goals, 46% reported making positive change. Regulatory cognition, as measured on the GAPI, consisted of indices of goal efficacy, self-efficacy, conflict, commitment, positive emotions, negative emotions, communication, support, and pressure; and the data revealed that the three goal ownership types had a significant effect on all nine GAPI subscales. Self-set and jointly set goals tended to yield higher regulatory ratings relative to partner-set goals (but did not differ from each other). Moreover, not only did regulatory goal cognition predict self-reported health behavior change, it mediated the relation between goal ownership and self-reported health change.

## Affect Regulation: Developing and Using TEARS

The self-regulation of emotional experiences (mood and affect) is widely considered to be a necessary aspect of mental health, the development of social competence, and, of course, emotional intelligence (Gross, 1999; Gross & Munoz, 1995; Halberstadt, Denham, & Dunsmore, 2001; Kopp, 1989; Kring & Werner, 2004; Salovey & Mayer, 1990; Wranik, Barrett, & Salovey, 2007). Importantly, the GRASSP perspective assumes that goals, emotions, and thoughts are inevitably interconnected within daily *goal episodes*—key units of the self-regulatory system that, together with the current context, help determine the course that people try to steer. Hence people are not always motivated to turn off or minimize negative feelings and/or to amplify positive emotions. As noted by Martin and Davies (1998), people tend to seek what they consider to be favorable evaluations or outcomes; and sometimes a negative mood can elicit a contextually defined positive outcome, whereas a positive mood can precipitate a social loss (cf. also Bless & Fiedler, 2006; Forgas, 2007). Therefore, because strategies for the real time, goal-directed modulation of day-to-day emotions are central to effective goal pursuit, it is imperative that psychologists develop brief, easy-to-use measures of emotion regulation that are not tied to specific stimuli (such as stressors), that are not too heavily weighted by dysregulatory facets (such as rumination or catastrophizing), and that do not presume to link affective amplification and affective reduction to good versus poor adjustment, respectively.

With these considerations in mind, Hamilton and her coworkers (Hamilton et al., 2009) have been developing TEARS (The Emotion Amplification and Reduction Scales). Derived from the view that emotion regulation measurement must focus on people's attempts to alter the dynamics or the trajectory of an emotional response, including its magnitude, duration, and latency, as well as on the content of what is felt (see

Gross & Thompson, 2007), Hamilton et al. designed an instrument to measure two experiential dimensions: self-reported skills for emotion amplification and self-reported skills for emotional down-regulation or reduction. Items were generated on a rational basis and administered to a variety of populations until reliability, concurrent validity, and factor structure achieved acceptable levels. The finished instrument consisted of two 9-item subscales, one focused on amplification (with content reflecting the intensifying, harnessing, and prolonging of emotions) and the second focused on emotion reduction (with content reflecting softening, shortening, stopping, preventing, and selecting one's emotions).

The construct validity of the instrument involved examining the relationship between TEARS subscales and related indices of emotional health. After controlling for age and gender, emotion amplification and emotion reduction were found to be associated with positive affect (the latter only marginally). Emotion reduction was also inversely correlated with negative affect, symptoms of depression, and fatigue, indicating that it is a useful index of affective "health."

TEARS remind us that goals must be accompanied by regulatory skills and concordant beliefs about those skills. Items from this instrument, such as "I can choose to remain calm in almost any situation" (reduction) or "If I want to, I can get myself emotionally 'charged up' " (amplification), serve to illustrate that regulatory appraisals matched to specific goals are important components of the overall motivational system and are proper targets of individual differences research.

## Goal-Discrepant Evaluation of Self: The Impact of Inverse Identities

Goal-directed thinking is not always forward-looking. Inspired by Kahneman and Miller's (1986) theory of how norms are constructed on the fly often through "backward thinking" about alternatives, as well as by Higgins's (1987) ideas concerning self-ideal comparisons and their implications, my colleagues and I have been exploring a style of chronically accessible self-appraisal that is built around a discrepancy-centered or "unfinished business" mindset. Not surprisingly, our conception of self-evaluation as a potentially fuzzy process, balanced not so much on a definite or affirmed status but on counterfactuals, places goals at the relational pivot point. To the degree that goals shape our autobiographical memories (Conway, 2005), that one's sense of self is a dynamic construction (Mischel & Morf, 2003), that people are prone to contrast themselves to future "possible selves" (Markus & Nurius, 1986), that reactions to goal–performance discrepancies can be modified by beliefs and attributions (Donovan & Williams, 2003), and that any ordinary appraisal of goal progress inevitably and ironically brings about an awareness of incompleteness (unless the goal is fully attained), it seemed reasonable to assume that certain self-defeating ways of processing unfinished agendas might adversely impact adjustment. Whereas other investigators have assessed the type or

degree of experienced mismatch and then demonstrated links to psychopathology (e.g., Strauman, 1989) or have elicited narrative accounts of the psychological impact of life-changing discrepancies (King & Hicks, 2007), we elected to create a set of four content-specific scales, called the Goal-Discrepant Evaluation of Self Scales (GODESS), to gauge discrepancy-driven interpretive frames presumably set in motion during goal progress monitoring.

In light of our interest in dysfunctional adjustment, we postulated four related ways that discrepancy-minded people might tend to perpetuate rather than counteract their sense of being "off the mark." Our first scale is called "Incomplete Self" (and consists of items such as: "I am often aware of how far off the achievement of my important life goals seems to be"). The second scale is called "Wishful Thinking" (e.g., "I daydream about being somebody with no weaknesses or faults"). The third scale, labeled "Counterfactual Regret," contains statements such as "When I think about the past, I regret that many of my decisions and actions took me 'off course' from my goals." And the fourth scale is called "Hopelessness" (e.g., "I am painfully aware of the things I will never achieve"). In preliminary work with large groups of undergraduate students (Karoly, 2005), we have accrued data supporting the psychometrics of our scales, including some interesting validity data in the form of GODESS correlations with varied clinical indices. For example, in a study with 115 students, we hypothesized that the GODESS would be related to students' feelings of anxiety. We assessed both social desirability and self-concept clarity and entered these in the first step of a multiple regression analysis. Whereas we accounted for 10% of the variance in Manifest Anxiety scores using these covariates, the addition of three of the GODESS scales (Incomplete Self, Wishful Thinking, and Counterfactual Regret) yielded an $R^2$ change of .364.

Although our findings are preliminary, it would appear that the GODESS (like TEARS) gauges individual differences in aspects of self-regulatory, goal-relevant thought that should prove useful in advancing our appreciation of functional and dysfunctional aspects of motivation.

## Concluding Comment

A while ago, I proposed (Karoly, 1999) that at least 14 facets comprise the human goal system.[4] Appreciating that theories that strive to be empirical are always underserved by data, I am currently unsure about the best and most parsimonious way to parse the terrain that is goal psychology. Nevertheless, I continue to believe that goals are central to the operation of self-regulatory systems and that we have not fully exploited the interconnections between goal systems and other regulatory system components such as executive competencies (including working memory, inhibition, and task set switching), instrumental expressive skills, and situational support structures.

As the focus of this volume is the connection between personality and self-regulation, it strikes me that the field might do well to regress back to the time when the

term *character* was used to refer to personality. We might benefit from labeling the humans with whom we work not as subjects, or participants, or respondents, or samples, or populations, but as "characters" in the dramatic sense. At the outset of this chapter, I waxed somewhat dramatic by defining self-regulation in terms of the sequential navigation of possibility spaces and, although I tightened my definitions along the way, I want to return now to the navigation metaphor.

In a volume entitled *The Grammar of Motives*, Kenneth Burke (1945) elaborated a pentad of features that defined the essence of drama: *characters* engaging in *action* that is animated by *goals* occurring in particular *settings* employing various *means* to bring about their intentions. Drama is said to occur when these elements are somehow out of alignment. If all good stories contain these five features, why not seek to tell a complete and fully fleshed out story of self-regulation by recognizing that, as motivational scientists, we must properly situate our science so that it can study its characters in the process of striving toward possibilities under both harmonious and discordant conditions. Whatever specific level of analysis one chooses as a base of operations for appraising self-regulation, it needs to be "grounded" in the functional ecology of everyday goal-guided action in context. Viewed in this theatrical light, we ought not to freeze the characters by fixing them into scenes, nor concentrate solely on their delivery of dialogue or their emotive range, nor focus on their entrances and exits, nor type-cast them, nor feed them lines from the wings, nor deconstruct their performances, nor try to micromanage their stage careers *unless and until* we have an appreciation of where they have been performing, what resources they bring to their unfolding story, and (most importantly) where they believe they are going.

## Notes

1 Notwithstanding the assumed validity of this assertion, raters or objective observers are clearly able to reliably organize, label, or categorize specific goals as internal or external, assigned or self-selected, or as falling under any number of other socially meaningful rubrics. Moreover, individual differences in the self-labeling of goals can sometimes provide useful diagnostic information about the labelers (Karoly, 1993a; Little & Chambers, 2004).

2 Of course, the desired state of affairs can also involve something one wishes to avoid or prevent.

3 The issue of *Assessment* in which this article was published in 1995 is currently unavailable from the publisher's (Sage Press) website. Although I'd like to think this paper has attained some archeological significance by virtue of its mysterious disappearance from the archival record, its status as a lost artifact is also quite frustrating. Hence I will happily make the paper available to interested readers upon request.

4 These dimensions comprised: content/classification, topography, process representation, structure, dynamics, procedural preferences, accountability/responsibility heuristics, the emotion interface, goal formalization (e.g., the processing modality, such as language, imagery, etc.), social context, intentional mindsets, developmental/temporal factors, biological/neurological effects, and the experiential dimension.

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# 11

# *Acting on Limited Resources*

## The Interactive Effects of Self-Regulatory Depletion and Individual Differences

**C. Nathan DeWall, Roy F. Baumeister, David R. Schurtz, and Matthew T. Gailliot**

Self-regulation refers to the ability to override or control one's thoughts, feelings, and behaviors. Effective self-regulation enables people to adapt to their social environment in a flexible manner, which facilitates obedience to norms, laws, and other standards for appropriate responding. The capacity for self-regulation in humans greatly exceeds that of other animals, which suggests that the very nature of the human psyche may have evolved to include traits that enabled our evolutionary ancestors to participate in cultural groups (Baumeister, 2005). As such, self-regulation may be among the most vital and distinctive of all human personality processes. Despite a heightened ability to self-regulate, humans frequently fail to exert sufficient control over their impulses. Failure to self-regulate successfully has been linked to many personal and social problems, such as criminal behavior, obesity, and low relationship quality (Baumeister, Heatherton, & Tice, 1994; Finkel & Campbell, 2001; Gottfredson & Hirschi, 1990).

Given the importance of self-regulation for promoting positive individual and social welfare, it is necessary to understand the manner in which self-regulation functions. Accumulating evidence suggests that self-regulation relies on a limited energy or strength, such that engaging in a single act of self-regulation depletes energy that is needed for subsequent attempts at self-regulation (see Muraven & Baumeister, 2000, for a review). When this limited energy has been used, people enter into a state of self-regulatory depletion, in which later attempts at self-regulation become impaired.

This chapter will discuss the implications of the limited resource model of self-regulation for personality. We will review a number of studies that demonstrate an interaction between individual differences and self-regulatory depletion. We argue that

self-regulatory depletion weakens inner restraints, which causes certain personality traits to exert a strong influence on different types of responses. If self-regulation can be considered a process that enables people to conform to external standards for desirable responding, then having adequate self-regulatory strength may lead people to respond in a uniform manner, regardless of their level on various personality traits. When the needed strength to self-regulate has been depleted, the influence of certain personality traits on responding may become especially pronounced. It is also possible that some personality traits might manifest themselves most strongly when self-regulatory strength is plentiful, compared to when the limited strength has been depleted. We will review evidence concerning individual differences in variables that are directly related to self-regulation, such as trait self-control, and variables that are not specifically linked to self-regulation, such as social anxiety and prejudice.

## Self-Regulation, Energy, and Self-Regulatory Depletion

A growing body of evidence suggests that self-regulation relies on a limited energy or strength, such that an initial act of self-regulation uses up some sort of energy that is needed for later attempts at self-regulation. A pair of early investigations tested competing predictions from three different models regarding how an initial act of self-regulation may impact performance on a second self-regulation task (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice, & Baumeister, 1998). According to cognitive schema theory, completing an initial act of self-regulation may activate knowledge structures related to self-regulation, thereby improving performance on a second task. A second possibility, based on a skill model, is that completing an initial act of self-regulation should have no influence on a second task because self-regulation relies on skills that remain constant across different situations. To be sure, individual differences in self-regulation are relatively stable over time (Hay & Forrest, 2006; Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990; Tangney, Baumeister, & Boone, 2004), which may lead one to expect that completing an initial self-regulation task will not influence performance on a second self-regulation task. The third possibility, based on the limited resource model, suggests that any act of self-regulation saps a common resource, leading to self-regulation failure even when the first task is unrelated to the second task. The evidence overwhelmingly supported the limited resource model. Self-regulation was consistently impaired on a second task as a result of having exerted self-regulation on a first task.

Predictions based on the limited resource model of self-regulation have been supported consistently and in a variety of different settings (see Baumeister, Vohs, & Tice, 2007). People in a state of self-regulatory depletion, compared to those whose self-regulatory resources have not been depleted, persist less on frustrating tasks (Baumeister et al., 1998), drink alcohol excessively even when they expect to perform a driving test (Muraven, Collins, & Neinhaus, 2002), perform poorer on tests of

general intelligence and logical reasoning (Schmeichel, Vohs, & Baumeister, 2003), are more likely to break their diets (Vohs & Heatherton, 2000), are less able to cope with aversive thoughts (Gailliot, Schmeichel, & Baumeister, 2006), are less helpful (Gailliot, Baumeister, Maner, & DeWall, 2007), and are more likely to respond to provocation with aggression (DeWall, Baumeister, Stillman, & Gailliot, 2007).

Viewing self-regulation as dependent on some limited resource, akin to an energy or strength, was helpful in terms of providing an explanation for an assortment of empirical findings. The notion of self-regulation as dependent on an energy resource may extend beyond mere metaphor, however. Blood glucose seemed one plausible candidate, as there is abundant research that low glucose levels and inefficient blood glucose tolerance (i.e., how well the body processes sugar) are associated with poor self-regulation (see Gailliot & Baumeister, 2007a, for a review). Recently, we tested whether depletion of self-regulatory resources also depletes blood glucose (Gailliot, Baumeister, DeWall, et al., 2007). Results from several studies suggested that acts of self-regulation reduced blood glucose levels. This drop in glucose was related to poor performance on subsequent self-regulation tasks. Consuming a beverage containing glucose eliminated the negative effects of self-regulatory depletion on later attempts at self-regulation, whereas consuming a beverage made with a sugar substitute did not wipe away the effects of self-regulatory depletion. Thus there is a physiological basis for the perspective that self-regulation depends on a limited resource.

The limited resource model was originally concerned with how initial acts of self-regulation consume energy needed for later attempts at self-regulation. Researchers have begun to identify other types of behaviors that consume energy, leading to poor self-regulation afterward. Vohs et al. (2008), for example, demonstrated that making decisions depleted the same resource used for self-regulation. Engaging in various kinds of social interactions can also deplete self-regulatory resources. Interracial interactions, compared to same-race interactions, consume more self-regulatory resources and lead to poorer self-regulation on later tasks (Richeson & Shelton, 2003; Richeson & Trawalter, 2005). Forcing people to present themselves to others in a manner that is contrary to their habitual style also consumes energy that is needed for later attempts at self-regulation (Vohs, Baumeister, & Ciarocco, 2005).

In sum, a growing body of evidence suggests that self-regulation depends on a limited energy resource. Engaging in self-regulation depletes self-regulatory strength, which may reduce the level of blood glucose in the bloodstream.[1] A variety of behaviors appear to draw on limited self-regulatory strength, suggesting that any action that involves the self altering an initial response consumes energy needed for later attempts at self-regulation.

## Self-Regulatory Depletion and Individual Differences

In the previous section, we argued that self-regulation relies on a limited resource that becomes depleted after exertion. Individuals differ in the chronic motivations they

bring to situations that involve self-regulation. These differences may have implications regarding the impact of self-regulatory depletion on later responses. Self-regulation involves overriding impulses in order to bring one's behaviors in agreement with socially desirable standards. As such, a main goal of self-regulation is to encourage individuals to conform to norms for socially desirable behavior. People may have many different impulses regarding how they would like to act in a given situation, but self-regulation stifles these impulses and instead encourages people to do the one thing that society prescribes. Members of a large class may have several options for how to behave, for example, which may include taking notes, talking on the phone, sending email, or sleeping. Despite the many options for behavior, students override their impulse and follow the norm for doing the one thing society prescribes, namely taking notes. Therefore, the effect of some personality traits on behavior may become diminished when individuals have adequate self-regulatory strength. When individuals are in a state of self-regulatory depletion, behavior may become more variable and the effects of personality traits on behaviors may emerge more strongly.

This line of reasoning meshes well with Caspi and Moffitt's (1993) accentuation hypothesis. According to the accentuation hypothesis, individual differences in personality exert their strongest influence on responses when people are confronted with unpredictable situations. When confronted with unpredictability, people "opt for the least expensive behavioral option" (Caspi & Moffitt, 1993, p. 250). That is, people choose the behavior that consumes the least self-regulatory energy. Since behaving in ways that correspond with their personality traits requires little mental energy, people choose responses that match their personality traits when met with situations that are unpredictable. Caspi and Moffit focus on environmental factors that strengthen the influence of personality traits on behavior, whereas our own reasoning focuses on inner processes that strengthen the relation between personality and behavior. The two perspectives are similar, however, in their focus on how personality traits exert their strongest influence when people are motivated to conserve mental energy.

A competing hypothesis is that personality traits will exert a stronger influence on behaviors under normal circumstances (when people have adequate self-regulatory strength) than when people are in a state of self-regulatory depletion. Individuals differ in their motivations to conform to standards for socially desirable behaviors, which may lead to large differences in behaviors between individuals who are highly motivated to bring their behavior in line with standards and those who are less motivated. When individuals are in a state of self-regulatory depletion, those who are normally inclined to regulate to conform to social norms will become less able to do so and hence their behaviors may not differ from individuals who are normally unmotivated to regulate their behaviors. Therefore self-regulatory depletion may decrease behavioral variability and reduce the effects of personality traits on behaviors.

In this section, we review evidence regarding the interactive effects of personality traits and self-regulatory depletion. The aim is to demonstrate that personality traits have implications for how people respond when in a state of self-regulatory depletion. We will show how self-regulatory depletion causes certain personality traits to

manifest themselves strongly, whereas the influence of other personality traits on behaviors become attenuated when people are depleted of their self-regulatory strength.

### *Sociosexuality, Gender, and Sexual Infidelity*

Most societies have standards for what is considered appropriate sexual behavior. A common expectation in the US is that people in committed romantic relationships will restrain their impulses to have sex with people other than their romantic partner. One approach to the study of individual differences and self-regulatory depletion involves the relationship between sociosexual orientation and gender on infidelity. People who are inclined to engage in sexual relationships without a strong emotional commitment to their sexual partner are said to have an unrestricted sociosexual orientation (Simpson & Gangestad, 1991). Those with an unrestricted orientation therefore have somewhat weakened selection criteria for their sexual partners, which may lead to an openness or even eagerness to engage in sexual intercourse with people other than their romantic relationship partner. People with a restricted orientation, in contrast, are likely to engage in sexual behaviors only in the context of committed romantic relationships. To conform to societal norms for appropriate sexual behavior, people with an unrestricted sociosexual orientation, compared to people with a restricted sociosexual orientation, may have to exert more self-regulatory effort to resist the temptation to engage in extramarital or extradyadic sexual intercourse. If this is the case, then individuals with an unrestricted sociosexual orientation may have difficulties restraining their impulses to engage in infidelities when in a state of self-regulatory depletion.

Recent evidence suggests that willingness to engage in sexual infidelity can be predicted from an interaction between self-regulatory depletion, gender, and sociosexuality (Gailliot & Baumeister, 2007b). In one study, some participants had their self-regulatory resources depleted by having to break a habitual pattern of responding, whereas other participants performed a similar task that did not involve self-regulation. Participants then responded to hypothetical scenarios in which they were involved in a committed, heterosexual relationship and were given the opportunity to engage in sexual intercourse with someone other than their relationship partner. Participants rated how likely they would be to engage in a sexual infidelity based on what they thought they would do at the present moment. Results revealed that both sociosexual orientation and gender interacted with self-regulatory depletion condition to predict willingness to engage in a sexual infidelity. Consistent with the view that one main goal of self-regulation is to encourage conformity to societal norms, nondepleted participants showed relatively low levels of willingness to engage in a sexual infidelity regardless of their gender or sociosexual orientation. That is, when people were operating at full self-regulatory capacity, most people expressed willingness that conformed to social norms against sexual infidelity, resulting in low levels of behavioral variability. Among depleted participants, in contrast, males and sexually unrestricted individuals reported higher levels of willingness to engage in sexual intercourse with someone

other than their romantic relationship partner compared to females and sexually restricted individuals.

These findings agree with the prediction that self-regulatory depletion can strengthen the influence of personality traits on behavioral intentions. People who are sexually unrestricted and male, compared to those who are sexually restricted and female, have heightened desires to engage in sexual infidelity (e.g., Baumeister, Catanese, & Vohs, 2001; Kinsey, Pomeroy, & Martin, 1948; Simpson & Gangestad, 1991). The implication is that males and people who are sexually unrestricted have to exert substantial amounts of self-regulatory energy to stifle their impulses to commit sexual infidelities. When they have sufficient self-regulatory strength to regulate their sexual impulses, their willingness to break norms does not exceed those of individuals who require less energy to override their sexual impulses. If their self-regulatory resources have been depleted, however, then it is more difficult for sexually unrestricted individuals and men to control their impulses compared to people with lower desires to engage in sexual infidelity.

### *Relationship Length and Sexual Restraint*

Yet another social norm regarding sexual behavior is the length of time in the course of a relationship that must be reached before the partners become sexually active (Baumeister & Bratslavsky, 1999; Cohen & Shotland, 1996). One or both members of a couple may feel strong sexual impulses early in a relationship, but most people regard it as inappropriate to engage in intense, sexual behavior right away. Self-regulatory depletion weakens inner restraints that normally suppress sexual impulses from being translated into sexual behaviors. Therefore, more self-regulatory strength may be needed to restrain sexual impulses early in a relationship compared to when trust and intimacy have been established after a period of time. If this is the case, then self-regulatory depletion may have an especially strong impact among couples who are at an early stage in their relationship than on more established couples.

To test this prediction, Gailliot and Baumeister (2007b) invited couples to the lab and had some of them complete an attention control task designed to deplete their self-regulatory strength (ignore stimuli while watching a video clip), whereas other couples completed a similar version of the task that did not involve self-regulation (watch a video clip as they would normally watch television). After watching the video clip, couples were given the opportunity to express as much physical affection for each other as they wanted in a private laboratory room. Among couples whose self-regulatory strength had not been depleted, advanced couples, compared to inexperienced couples, tended to engage in more advanced levels of intimacy. This is not especially surprising, given that the advanced couples likely had a longer and more intricate history of sexual intimacy than did the couples who were at an early stage in their relationship. When couples had their self-regulatory strength depleted, however, the inexperienced couples engaged in more extensive levels of physical intimacy than did the advanced couples. Thus self-regulatory depletion had a strong impact on the level

of physical intimacy expressed by couples who were still regulating their sexual impulses with each other, but depletion had very little effect among couples whose sexual habits had been established over the course of their relationship. Just as men and sexually unrestricted people needed self-regulatory strength to restrain their willingness to engage in sexual infidelity, the current findings suggested that inexperienced couples need self-regulatory strength to conform to the norm of not going too far sexually early on in a relationship. Self-regulatory depletion weakens inner restraints that normally stifle sexual impulses, which makes it more difficult for inexperienced couples to restrain their desire to show appropriate levels of physical affection.

### *Eating and Dieting*

Dieting requires self-regulation. Most diets involve resisting the temptation to eat sugary, sweet, fattening foods and instead eating less desirable, healthy, low fat, fruits, vegetables, and grains. In addition to the types of foods that must be resisted, diets often require people to regulate the size of the portions that they consume. Therefore, dieters, compared to nondieters, exert more self-regulatory strength to refrain from eating large amounts of unhealthy foods. When the inner restraints that enable people to resist tempting foods are weakened through self-regulatory depletion, dieters may find themselves eating more compared to people who do not chronically regulate their eating behavior. Several studies have shown that restrained eaters (dieters) consumed more food after their self-regulatory strength had been depleted than when they were operating at full self-regulatory capacity (Kahan, Polivy, & Herman, 2003; Vohs & Heatherton, 2000). Nondieters, in contrast, ate the same amount regardless of whether they had previously engaged in a self-regulatory exercise or not.

Dieters and nondieters presumably have the same desire to eat, but the two groups differ in terms of the chronic restraint that is exerted when eating. Self-regulatory depletion weakens inner restraints, which causes decrements in the ability of dieters to restrain their eating. Thus self-regulatory depletion suppresses the effect of chronic dietary restraint on eating behavior. When self-regulatory resources are plentiful, dieters eat less than do nondieters. When both groups are in a state of self-regulatory depletion, however, dieters and nondieters eat the same amount.

### *Alcohol Consumption and Temptation to Drink*

The previous subsection suggested that self-regulatory depletion has the strongest effect among people who chronically restrain their eating behavior. An extension of the limited resource model of self-regulation would suggest that as the urge to engage in a behavior increases, more self-regulatory resources are required to suppress that urge. Self-regulatory depletion should therefore have the strongest impact among people who have the strongest urges. Under normal circumstances, behavior should be uniform

regardless of the level of urge a person has. Jackie and Johnny see the same cake, for example. Jackie has no desire to eat the cake, whereas Johnny has a strong desire to eat the cake. Despite their difference in strength of urge, the behavioral result will be the same: Neither Jackie nor Johnnie will consume the cake. When people are depleted, behavior should be highly variable among people with high and low levels of chronic urges. Although Jackie and Johnnie normally behave similarly despite their different level of urge, their behavior may differ when their self-regulatory strength has been depleted. With less ability to override his chronically strong impulse, Johnny will be more likely to eat the cake. Jackie, who did not have a strong urge to eat the cake, will be equally likely to eat the cake regardless of her level of self-regulatory strength.

Research on alcohol consumption suggests that self-regulatory depletion unleashes drinking behavior most strongly among people who have strong impulses to drink alcohol (Muraven et al., 2002). In one study, participants first completed the Temptation and Restraint Inventory (TRI; Collins & Lapp, 1992), which is a measure of individual differences in temptation to drink alcohol. Participants then completed a thought suppression task designed to deplete their self-regulatory strength, whereas other participants completed math problems. After completing the thought suppression task or math problems, participants were given two pitchers of different types of beers as part of an ostensible taste-testing task. As part of the taste-testing task, participants were instructed to consume as much or as little of both types of beer as they desired and was necessary in order to provide accurate ratings of the various taste properties of the beers. To decrease extreme drinking behavior, participants were reminded that they would complete a simulated driving test later in the experiment in which successful performance could earn them a monetary reward. To adhere to norms against drinking alcohol before driving, participants had to stifle their impulse to consume large quantities of alcohol.

Replicating previous effects in the depletion literature, participants who exercised self-regulation on an earlier task, compared to those who did not, consumed more alcohol during the ostensible taste-testing task. Of greater relevance to the current chapter, there was an interaction between depletion and individual differences in temptation to drink alcohol. Participants with chronically high levels of temptation to drink alcohol consumed more alcohol than did participants with low levels of temptation, but this effect was only found among participants whose self-regulatory strength had been depleted. Among participants who were fully capable of self-regulation (i.e., those who simply completed the math problems), there was no difference in drinking behavior between participants who were high and low in temptation to drink alcohol.

The findings suggest that most people are motivated to refrain from drinking large amounts of alcohol prior to a driving test, presumably to bring their behavior in line with social norms admonishing drinking and driving. When people have sufficient self-regulatory strength, they are able to restrain their drinking behavior, regardless of their chronic temptation to drink alcohol. When in a state of self-regulatory depletion, those who have high levels of temptation to drink alcohol are less able to restrain their strong urge to drink, leading to increases in alcohol consumption.

### *Stereotype Suppression*

One norm that has become increasingly pervasive involves restraining thoughts or behaviors that are prejudiced or that endorse stereotypes (Gaertner & Dovidio, 1986; Sommers & Norton, 2006). Self-regulatory depletion may weaken inner restraints that keep prejudiced or stereotypical thoughts in check, leading to increases in the use of stereotypes. There are individual differences in how much people are motivated to suppress impulses to think or behave in prejudiced or stereotypical terms. Some people are motivated to appear nonprejudiced in their daily interactions, whereas other people are less concerned with whether they appear prejudiced. To adhere to norms against appearing prejudiced, people with a low motivation to suppress prejudice, compared to those who are highly motivated to suppress prejudice, may have to exert more self-regulatory effort. When depleted of their self-regulatory resources, people low in motivation to suppress prejudice would lose the ability to override their impulses to use stereotypes.

Consistent with this reasoning, Gordijn, Hindriks, Koomen, Dijksterhuis, and Van Knippenberg (2004) showed that self-regulatory depletion increases the use of stereotypes. In their study, participants wrote an essay about the day in the life of a skinhead, and some were required to follow instructions designed to deplete their self-regulatory strength (i.e., forbidding the use of stereotypes). Participants then completed a task in which they had to describe an elderly person. Replicating standard depletion effects, participants who were made to suppress their use of stereotypes, compared to those who wrote an essay without having to suppress stereotypes, used more stereotypes when describing an elderly person. More relevant to the current chapter, there was an interaction between depletion condition and individual differences in motivation to suppress prejudice (Plant & Devine, 1998). Suppressing stereotypes had the strongest effect among participants who were low in their chronic motivation to suppress prejudice, which led them to use more stereotypes in their description of an elderly person than did nondepleted participants. Participants who were high in motivation to suppress prejudice, in contrast, used relatively low levels of stereotypes in their description of an elderly person regardless of whether they were in the depletion or no depletion condition. To be sure, the opposite pattern of findings could have been predicted. Participants who were instructed to refrain from using stereotypes in their essay may have been primed with the goal of suppressing stereotypes, which may have led them to use fewer stereotypical descriptions of elderly people compared to participants who wrote the essay without having to suppress their use of stereotypes. Instead, and consistent with the limited resource model of self-regulation, suppressing the use of stereotypes related to skinheads on a first task depleted participants' self-regulatory strength, which in turn made them more willing to use stereotypes when providing descriptions of another, elderly person.

Another recent study showed that the effect of self-regulatory depletion decreased cognitive control of stereotypic responding, but depletion did not influence stereotyping based on automatic bias (Govorun & Payne, 2006). In that study, participants

first completed either 30 or 300 incongruent trials of the Stroop task (i.e., naming the color of a word when the word meaning conflicts with the color of ink). The incongruent version of the Stroop task requires self-regulation, but the authors reasoned that 300 trials, compared to 30 trials, would deplete more self-regulatory resources. Participants then completed the weapons identification task (Payne, 2001), which required participants to identify objects as guns or tools as quickly as possible. Before an object was presented, participants were primed with a White or African-American face. The weapons identifications task provides measures of cognitive control of biased responding, automatic bias, and errors related to stereotypes committed while performing the task. Results showed that depletion caused decrements in how well participants were able to exert cognitive control of bias toward African-Americans, but depletion did not influence automatic bias toward African-Americans. Notably, there was an interaction between depletion condition and automatic bias on the number of errors that participants made on the weapons identification task. Among participants low in automatic bias toward African-Americans, depletion had no influence on the number of stereotypical errors participants made. Participants high in automatic bias, in contrast, made substantially more stereotypical errors when depleted.

Both sets of findings provide further evidence that self-regulatory depletion enhances the effects of personality traits on responding. Chronic motivation to suppress prejudice only influenced the use of stereotypes after participants' self-regulatory strength had been depleted, presumably because the inner restraints that usually stifled the use of stereotypes were weakened after depletion. Depletion influenced cognitive control of bias toward African-Americans, but depletion did not influence bias that was automatic and therefore not reliant upon available self-regulatory resources. Automatic bias toward African-Americans was positively correlated with the number of errors related to stereotypes. Thus depletion caused the effects of individual differences in motivation to suppress prejudice and automatic bias on stereotype usage to become especially strong.

### *Social Anxiety and Passivity*

Passivity constitutes a crucial aspect of self-regulation, insofar as people who behave passively are not making use of the self's executive function (Baumeister, 1998). Social interactions frequently involve some level of self-regulation, which might cause depleted people to behave passively as opposed to actively. Individuals differ in terms of how much they regulate themselves in social interactions, which may have implications for how passive they are in social interactions. Social anxiety is one personality trait that involves chronic regulation of one's behavior in social interactions. A hallmark feature of social anxiety is fear of negative evaluation across a variety of social and/or performance domains (American Psychiatric Association, 2000). Because of their heightened fear of negative evaluation, people high in social anxiety tend to behave passively in their social interactions. Under normal circumstances (when self-regulatory

resources are adequate), people high in social anxiety should behave more passively in their social interactions compared to people low in social anxiety. When in a state of self-regulatory depletion, however, people low in social anxiety will have less ability to regulate their behaviors and hence may become increasingly passive in their interactions. Depletion may therefore eliminate the link between social anxiety and passivity.

Several studies have confirmed the prediction that depletion reduces the effect of social anxiety on behavioral passivity (Gailliot, Vohs, & Baumeister, 2009). Specifically, social anxiety did not correlate with passivity under conditions of self-regulatory depletion. In contrast, social anxiety and passivity were significantly correlated among participants who had not previously exerted self-regulation.

Social interactions frequently involve overriding impulses so as to make a good impression (Vohs et al., 2005). When people lack the resources that are necessary to regulate their social behavior, then they become passive in their social interactions. People high in social anxiety tend to show signs of passivity in their interactions, regardless of whether their self-regulatory resources have been depleted or not. In contrast, people low in social anxiety are typically able to regulate their impulses in social interactions, but when depleted they are less able to regulate themselves and hence become as passive in their interactions with others as do people high in social anxiety.

### *Attachment Style and Self-Presentation*

Presenting one's best self is a crucial aspect of social interaction. People may realize that giving into their impulses may result in behaviors that might convey a negative impression to others and adjust their behaviors accordingly. Making a good impression may therefore require self-regulatory strength. When in a state of self-regulatory depletion, people will be less able to override their impulses and their behaviors may take the form of those that bring immediate gratification but also make a poor impression on others.

To test this possibility, Vohs et al. (2005) conducted a pair of studies in which people made choices regarding the intimacy of a disclosure to a stranger after having been depleted or not. A large body of research suggests that disclosing medium levels of intimacy to strangers elicits the most positive reactions (Altman & Taylor, 1973; Jones & Wortman, 1973). People who only share information that is low in intimacy may convey an impression of being aloof, arrogant, or downright hostile. Sharing information with strangers that is high in intimacy, on the other hand, may convey a sense of being overly anxious, needy, or manipulative. Therefore, the norm to which most people adhere is to share medium levels of intimacy in initial encounters, lest one give off an impression of being aloof (for sharing impersonal information) or neurotic (for sharing highly personal information).

There are individual differences in how much personal information people tend to disclose in their social interactions, which is commonly referred to as attachment style

(Bowlby, 1982). People with an avoidant attachment style prefer to remain distant in their interactions, whereas people with an anxious/ambivalent attachment style are comfortable sharing highly intimate details of their lives. To adhere to the norm that encourages sharing intermediate levels of intimacy with strangers, people with avoidant and anxious/ambivalent attachment styles may have to exert substantial self-regulatory effort. When these people are in a state of self-regulatory depletion, their normal inclinations to share impersonal or highly intimate information should become pronounced. People with a secure attachment style, who are comfortable sharing information that is medium in terms of level of intimacy, should share similar types of information regardless of whether their self-regulatory strength has been depleted or not.

In one study by Vohs et al. (2005), participants first completed Hazan and Shaver's (1987) measure of adult attachment style. Participants were then exposed to the self-regulatory depletion manipulation, which consisted of some participants regulating their emotional responses (i.e., suppressing or exaggerating their emotional reactions) to a comedic video clip (depletion condition), whereas other participants watched the video clip as they would normally watch any video (no depletion condition). A second experiment used the Stroop task to manipulate self-regulatory depletion. After watching the video clip or completing the Stroop task, participants were informed that they would complete a brief interaction with another participant, and were given a list of discussion topics from which they could choose. The topics list was adapted from the relationship closeness induction task (Sedikides, Campbell, Reeder, & Elliot, 1999), which includes topics that are low, medium, and high in terms of level of intimate disclosure.

Results revealed that self-regulatory depletion, whether in response to controlling emotional reactions or completing the difficult version of the Stroop task, unleashed desires for people to choose levels of intimate disclosure that were consistent with their attachment style. After having their self-regulatory strength depleted, avoidant participants chose low-intimacy topics and anxious/ambivalent participants chose high-intimacy topics. When their self-regulatory resources were left intact, individual differences in attachment style had no effect in terms of the level of intimate disclosure participants selected.

These findings provide further evidence that self-regulatory depletion causes the effect of personality traits on responses to manifest themselves strongly. Under normal circumstances, people are capable of overriding their personal inclinations in order to bring their behavior in line with the norm of intermediate disclosure in first-time meeting encounters. In the Vohs et al. (2005) study, the impact of individual differences in attachment style on intimate disclosure was negligible and behavior was essentially uniform (but see Mikulincer & Shaver, 2003, for examples of how attachment style can influence a variety of outcomes). Under conditions of self-regulatory depletion, however, avoidant people preferred talking about insignificant personal information and anxious/ambivalent people chose to discuss highly intimate details of their life. In this context, depletion impaired the ability for people to suppress socially undesirable aspects of the self, resulting in highly variable behavior.

### *Trait Self-Control, Impulsivity, and Intelligence*

The previous subsections showed that several personality traits (other than trait self-control) interacted with self-regulatory depletion to predict a variety of responses. Chronic motivations to control one's impulses may also moderate responses to self-regulatory depletion. People who typically have a low motivation to regulate their responses, compared to those who are generally motivated to regulate themselves, may exert more self-regulatory energy to adhere to norms regarding socially desirable behavior. Depletion may therefore unleash desires to behave according to one's impulses among people who are normally disinclined to self-regulate, even if those impulses conflict with norms for appropriate responding.

In one study by DeWall et al. (2007), participants completed a measure of trait self-control (Tangney et al., 2004) and were then exposed to a depletion manipulation. Some participants were made to break a habit (depletion condition), whereas other participants completed a boring task that did not involve self-regulation (no depletion condition). Next, participants were presented with a hypothetical scenario that asked them to imagine they were insulted by a stranger and that their romantic partner appeared to be flirting with the offender at a bar. Participants were asked how likely they believed they would be to respond to such a provocation in a violent manner, namely by smashing a beer bottle over the offender's head. Results showed that depleted participants, compared to nondepleted participants, reported higher levels of behavioral intentions to aggress toward the issuer of the insult. More relevant to the current chapter, however, was an interaction between depletion and trait self-control. Participants high in trait self-control reported relatively low levels of aggressive intentions, regardless of whether they had exercised self-regulation on a previous task or not. The pattern of findings was substantially different, however, among participants low in trait self-control. If their capacity for self-regulation was at full capacity, participants low in trait self-control were able to stifle their aggression impulses. When they were in a state of self-regulatory depletion, in contrast, participants low in trait self-control gave in to their natural disinclination to regulate their responses, which resulted in them reporting higher levels of intentions to behave aggressively. Thus depletion caused the effect of personality traits on behavioral intentions to become pronounced, whereas aggressive intentions were uniform when people had sufficient self-regulatory resources to adhere to norms admonishing violence.

Just as people differ in their level of chronic motivation to self-regulate, they differ in their tendencies to engage in impulsive actions. In one study by Schmeichel and Harmon-Jones (2007), participants completed a questionnaire that assessed trait impulsivity, specifically the Trait-Impulsivity Scale (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Half of the participants then had their self-regulatory strength depleted, whereas the rest of the participants completed a task that left their self-regulatory resources intact. Next, participants completed a gambling task. The experimenter gave participants a mock $50 bill and told participants that they could choose to either keep it

or wager it on a computerized coin-flip. If they won, then they would win another $50, whereas they would lose all $50 if they lost. After each trial, the participant was given another mock $50 bill and the same instructions. Willingness to wager the fake $50 was used as the measure of self-regulation, since participants had to override their impulse to bet on each trial in order to bring their behavior in line with norms regarding saving money and responsible gambling behavior. Among participants in the control (no depletion) condition, there was no effect of trait impulsiveness on betting behavior. In contrast, self-regulatory depletion caused the effect of trait impulsiveness to manifest itself strongly. Compared to when they were not depleted, participants high in trait impulsivity engaged in higher levels of risky betting behavior under conditions of depletion. Participants low in trait impulsivity, in contrast, became more conservative in the amount of risks they took when depleted than when not depleted.

Another approach to the study of individual differences that moderate responses to self-regulatory depletion is based on the possibility that people with high levels of cognitive ability (i.e., IQ) devote more self-regulatory resources when completing tasks, which may cause them to become more susceptible than others to the effects of depletion. Past research has shown that people with high gF (a unit used to measure fluid intelligence), compared to those with low gF, show increased activation in various brain regions while completing effortful tasks (Gray, Chabris, & Braver, 2003; Gray et al., 2005). Increased neural activation may be associated with greater expenditure of self-regulatory energy. Therefore, compared to people with low gF, people with high gF may mobilize more of their self-regulatory resources to perform an initial task well, leaving fewer resources available for subsequent attempts at self-regulation.

In a study by Shamosh and Gray (2007), participants watched a video clip, and some participants were given instructions designed to deplete their self-regulatory strength (i.e., suppress their emotional reactions to a sad video clip), whereas others were simply told to watch the video clip. Before and after the depletion manipulation, participants completed a task that placed demands on their executive attention, namely the Multi-Source Interference Task (MSIT; Bush, Shin, Holmes, Rosen, & Vogt, 2003). Participants returned the next day to complete Raven's Advanced Progressive Matrices (APM; Raven, Raven, & Court, 1998), a common measure of gF. The 24-hour delay between the depletion manipulation and the APM was meant to restore participants to their baseline level of self-regulatory strength. Replicating previous depletion effects, participants who had to suppress their emotions while watching a video clip, compared to those who watched a video clip with no instructions to suppress their emotional response, performed worse on the MSIT (baseline MSIT scores were used as a covariate). For present purposes, the most notable finding was an interaction between depletion condition and individual differences in gF. Among participants in the control (no depletion) condition, there was no relationship between gF and self-regulation performance. In contrast, gF was positively correlated with poor performance under conditions of self-regulatory depletion. Thus people high in fluid intelligence, compared to those low in fluid intelligence, were more susceptible to the effects of self-regulatory depletion.

The findings reviewed in this subsection suggest that traits related to chronic motivation (such as trait self-control and trait impulsivity) may have a different impact on responses to self-regulatory depletion compared to traits related to chronic ability (such as fluid intelligence). One implication is that people who are chronically motivated to self-regulate and to stifle their impulses are buffered from the deleterious consequences of self-regulatory depletion. People with high levels of cognitive ability, in contrast, use up substantial amounts of self-regulatory resources on initial self-regulation tasks, leaving them with fewer resources needed for later attempts at self-regulation.

## Conclusion

The current chapter sought to provide a framework for understanding how personality traits moderate responses to self-regulatory depletion. People differ in how much they are normally willing and able to act in certain ways, such as eating or drinking too much, committing sexual infidelities, violating norms against engaging in intense sexual intimacies early on in a relationship, or disclosing high or low levels of intimate personal information with strangers. One might predict that these traits will exert a strong influence on responding, regardless of whether or not people are operating at full self-regulatory capacity. The findings from several investigations suggest otherwise.

Most of the findings suggest that self-regulatory depletion impacts people differently according to their levels of various personality traits. The most consistent pattern of findings showed that responses were low in variability under normal circumstances, presumably because people have sufficient self-regulatory resources to adjust their responses so as to remain in agreement with norms for appropriate behavior. Most people are able to adhere to norms for socially desirable responding, which causes the effect of personality traits to appear small or nonexistent. Depletion weakens inner restraints that normally keep socially undesirable responses in check, which causes the effect of personality traits on responding to manifest themselves strongly. When people are in a state of self-regulatory depletion, they resort to chronic motivations and desires when deciding how to act. The implication is that strong desires require substantial self-regulatory strength to suppress, which causes them to become released strongly when people are depleted. Weak desires, in contrast, involve little or no effort to stifle, and therefore depletion has little or no influence on how low levels of chronic desire are expressed.

Personality has a significant role in the study of human psychology, although there has been considerable debate as to how strongly personality traits influence behavior. Mischel (1968) argued that personality traits have a weak ability to predict behaviors, which is a view that has been reiterated repeatedly (e.g., Ross & Nisbett, 1991). Although recent work has demonstrated that personality traits exert a notable influence on important outcomes (Meyer et al., 2001; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007), the findings reviewed in the current chapter provide one possible explanation as to

why the effects of personality traits on behavior normally do not exceed the small-to-medium range in terms of estimated effect size. Under most circumstances, there is a single standard for what is deemed the appropriate type of behavior. Therefore, individual differences may appear to have little or no influence in predicting behavior because most people are conforming to a norm that encourages one type of response in a given situation. The findings we have reviewed suggest that personality researchers may consider measuring behaviors when people are in a state of self-regulatory depletion. By doing so, the crucial influence of personality traits on behaviors emerges all the more strongly.

The majority of the reviewed findings suggest that depletion strengthens the effects of personality traits on behavior, but there are two other patterns of findings that deserve consideration. The first pattern suggests that individual differences in the desire to control behavior are eliminated under conditions of self-regulatory depletion, whereas traits related to motivation to engage in the behavior become amplified when people are depleted. The findings with chronic dieters, for example, showed that individual differences in dietary restraint were eliminated when people were depleted. Dieters, compared to nondieters, normally exert control over their eating. Hence the effect of the trait of dieting status exerted its strongest influence when people were not depleted. Dieters ate more when depleted, but they ate as much as people who normally do not exert control over their eating. Thus chronic tendencies to exert control are reduced when people are depleted, causing individual differences to exert a small or trivial influence on behavior.

The second pattern of findings was related to increased passivity after depletion. Social anxiety moderated the effect of depletion on passivity, but again the effect of the personality trait on the behavior was eliminated—as opposed to strengthened—after depletion. Socially anxious people are normally passive in their social interactions, whereas people who are low in social anxiety normally behave with others in a proactive manner. Depletion had no effect among socially anxious people, presumably because their usual inclination is to approach social settings in a passive manner in an effort to minimize possible negative evaluations. People low in social anxiety, in contrast, require energy in their social interactions and therefore become increasingly passive when they are deprived of that energy.

Another potentially intriguing pattern of findings suggested that individual differences that are normally associated with desirable outcomes can function as potential risk factors for susceptibility to depletion. People differ in the amount of self-regulatory energy that is mobilized on self-regulation tasks. Some people exert substantial energy on self-regulation tasks, while others do not. People with high levels of fluid intelligence (i.e., gF), for example, devote considerable self-regulatory energy during demanding tasks, whereas people with low levels of gF do not. Self-regulatory depletion mainly affects people who use large amounts of self-regulatory energy on the initial task. Thus people with high fluid intelligence, compared to people who are low in fluid intelligence, suffer larger decrements in subsequent attempts at self-regulation when depleted. When the individual difference is in the amount of self-regulatory

energy that is typically mobilized, then traits that are normally desirable (i.e., high fluid intelligence) can bring about undesirable consequences.

This chapter reiterates the view that self-regulation is among the most important of all human personality processes. People may have chronic inclinations to engage in undesirable behaviors (ranging from sexual infidelity to prejudice), but they are normally able to stifle these desires so as to remain in agreement with norms for appropriate behaviors. Thus, regardless of individual differences in motivation or ability, people are usually able to adhere to laws, rules, or other standards for desirable behavior. Despite the remarkable capacity for self-regulation among humans, self-regulation is contingent upon a limited resource that becomes depleted after prior exertion. When people are in a state of self-regulatory depletion, inner restraints that typically restrain undesirable behavior are weakened. Depletion strengthens the effect of individual differences in motivation on behavior. In contrast, individual differences in control become weakened when people are depleted. There is some evidence that people differ in terms of how quickly their self-regulatory limited resources are depleted, which appears to be based on how much of the limited resource is mobilized initially.

The broader implication is that personality traits can exert a crucial impact on behavior, but their influence is typically diluted because people are operating at full self-regulatory capacity. The current findings suggest that personality traits manifest themselves strongly when people are depleted of their self-regulatory strength. By examining behavior as a function of both personality traits and amount of self-regulatory strength, a more detailed and accurate understanding of the role of personality traits on behavior may be possible.

## Note

1 Research testing the limited resource model of self-regulation has only recently begun to identify the actual resource that becomes depleted (i.e., blood glucose; Gailliot, Baumeister, DeWall et al., 2007). Therefore, we use the terms "resource" and "energy" in somewhat metaphorical terms to refer to what is depleted after an initial act of self-regulation. We do not use these terms to refer to differences in blood glucose levels unless stated explicitly.

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# Part III

*Individual Differences*

# 12

# *Working Memory Capacity and Self-Regulation*

**Malgorzata Ilkowska and Randall W. Engle**

Self-regulation and working memory possess at least one common feature: the dynamic nature of information processing as we pursue a goal. In order to self-regulate behavior or keep information active in working memory, we need to monitor the behaviors leading us to a relevant goal and allocate our attention towards that goal. At the same time, we have to resist or discard any attention capture by the information not relevant to the pursued goal. In order to succeed, we usually proceed through a series of steps including planning, maintaining a goal in active memory, updating information about the current activities according to the changing situation, and changing the goal when needed. In each of these steps, we differ in how we deal with conflicting situations in pursuing the goal. We also differ in how much information we can keep available in, or for, quick access to working memory, an ability that may help substantially improve or impair self-regulatory behaviors.

The aim of this chapter is to review the research on individual differences in working memory capacity and connect it to relevant research on self-regulation. We argue that individual differences in working memory capacity (WMC) results from both trait and state aspects of differences in the ability to control information being attended to, and therefore the contents of working memory, and believe there might be important similarities and links between successful self-regulation, self-regulatory failure, and working memory capacity.

We begin by defining self-regulation and discussing the more global concept of higher order cognitive processes as executive functions. We next briefly describe how executive processes develop and how their development may be relevant to self-regulatory behaviors. We next turn to a discussion of the concept of working memory capacity and the relevant tasks and research pertaining to it. Our discussion then turns to how to connect the research on working memory and self-regulatory behaviors by

examining possible relationships between them and looking at studies that explore these concepts.

## Self-Regulation

The goal of self-regulation is to monitor and adjust behaviors in order to meet a goal state and at a more general level fulfill our constant endeavor towards well-being (Marques, Ibanez, Ruiperez, Moya, & Ortet, 2005). Overall, self-regulation represents an effort to alter our reactions in order to guide subsequent behaviors and thoughts (Schmeichel, 2007; Vohs & Baumeister, 2004). We define self-regulation as the process by which one monitors, directs attention, maintains, and modifies behaviors to approach a desirable goal. This definition of self-regulation relates quite closely to another important attainment in the way of behavior regulation—self-control.

Self-regulation research takes two routes of defining self-regulation. In both, self-regulation relates closely to self-control. According to one view, researchers relate self-regulation to self-control, yet treat them both as different forms of volition (cf. Kehr, Bles, & von Rosenstiel, 1999; Kuhl, 1996). According to this view, self-regulation fulfills positive and cooperative needs leading towards the goal. Self-control, on the other hand, engages in inhibitory and control processes. However, other researchers define self-regulation and self-control as two terms roughly equivalent in meaning. In this chapter, we consider self-regulation and self-control as similar constructs presented by the second definition of self-regulation. As Vohs and Baumeister elegantly note, one may treat self-control and self-regulation as the same entities using both terms interchangeably in describing behaviors requiring effortful control. According to this point of view, self-regulation and self-control, or self-discipline and effortful control, are similar constructs serving as a control over a wide range of behaviors (Carver & Scheier, 1981; Rothbart & Posner, 1985; Vohs & Baumeister, 2004). Moreover, these control processes require feedback in order to monitor and adjust behaviors according to the current circumstances (Carver & Scheier, 1981).

Without a doubt, the instances of successful self-regulation improve our subjective well-being (Jensen-Campbell, Waldrip, & Campbell, 2007). However, self-regulatory difficulties are not rare and often result in one of many kinds of self-regulatory failure (Baumeister, Heatherton, & Tice, 1994; Vohs & Baumeister, 2004). Self-regulatory failure manifests itself as a misregulation, for example, because of counterproductive behaviors arising from wrong assumptions. Another way self-regulatory failure can occur is under-regulation, a consequence of self-destructive behaviors, for example, inability to concentrate on the task due to intrusive thoughts. The extreme form of self-regulatory failure is simply a cessation of regulation, such as quitting the task, sometimes leading to states of helplessness. In this chapter, we mainly focus on the instances of self-regulatory failure. We attempt to convince the reader

that one of the causes that lead to self-regulatory failure stems from issues concerned with working memory, limitations in its capacity, and the ways people use its limited resources.

## Working Memory, Executive Processes, and Developmental Path

We define working memory (WM) as a system comprising encoding, maintaining, and retrieving from long-term memory the information, goals, and strategies necessary to perform a task (Unsworth & Engle, 2007). This system consists of storage buffers, rehearsal or re-storage processes, and a supervisory attention mechanism (Norman & Shallice, 1986) or a control network (Chein & Schneider, 2005). According to Baddeley and colleagues, the working memory system contains a speech-based phonological store dealing with verbal information, a visual spatial store for processing visual and spatial information, and an episodic buffer (Baddeley & Hitch, 1974) in which information from different domains is represented, during which time it is bound together, a process neuroscientists call binding. We have argued, however, that there are as many storage buffers as there are types of information (Engle & Kane, 2004). Thus we would argue that there are likely storage buffers for information such as acoustic, olfactory, and motoric experiences just as there are for articulatory and spatial information.

Before discussing working memory in finer detail, we refer to the commonly used, if poorly specified, term, *executive functions*. Executive functions describe the entirety of cognitive processes important for higher level cognition (Miyake, Friedman, Emerson, Witzki, & Howerter, 2000; Rueda, Posner & Rothbart, 2005). In the broadest sense, executive function is an umbrella term for all processes recruited for managing and controlling cognition, encompassing also working memory. The purpose of executive functions is to monitor and regulate cognitive processes while performing complex cognitive tasks, employing different strategies, or performing a search process. Because in most instances complex cognitive tasks require control of attention, analysis of the content of these tasks requires an engagement of multiple processes, including but not limited to judging and decision making, broken down further into action planning, selection, resolution of conflict, and correction of errors. When a person inhibits a prepotent response to comply with task demands, attention control is brought into service. We use attention control also in demanding situations towards a goal state in attempts to delay gratification, as well as when dealing with complex tasks tapping executive processes.

Next, we consider the developmental path of executive attention and self-regulation, functions that during the process of child development gradually become more complex, fully developed in puberty. Many developmental researchers have addressed the issue of interplay of executive attention and self-regulation by studying the development of

executive function (Klenberg, Korkman, & Lahti-Nuuttila, 2001; Miyake et al., 2000; Rueda, Posner, & Rothbart, 2005; Posner & Rothbart, 1998; van der Sluis, de Jong, & van der Leij, 2007; for a review see Garon, Bryson, & Smith, 2008). As Posner and Rothbart (1998) argue, "the same mechanisms used to cope with self-regulation of emotion are then transferred to issues of control of cognition during later infancy and childhood" (p. 1922). We next turn to a brief description of what these processes are and how they are measured.

Children acquire ability to regulate conflict and deal with competing stimuli through inhibitory processes as they explore the world around them more and more deliberately. The simplest control processes emerge at the end of the first year of life when a child is capable of inhibiting prepotent responses concerning basic behaviors, such as crying because of a stressful or ambiguous situation. At age 18–30 months, children show basic self-control behaviors, for example, compliance with maternal directives (Vaughn, Kopp, & Krakow, 1984) or delay of gratification for stimuli attractive to a child when asked to do so. In a delay of gratification task, a child has to restrain its willingness to respond quickly to get a desired reward. The measure of how long a child is able to delay this response indicates the ability to control and restrain gratification temptation.

With increasing age, children show significant improvements in working memory and executive attention as they acquire basic perceptual and sensorimotor capabilities. These changes parallel physiological maturation and establishment of the neural bases allowing integration of complex processing demands important in working memory and self-regulatory behaviors (Klenberg et al., 2001; Luciana & Nelson, 1998). This improvement allows toddlers to effectively inhibit and keep under control certain motor and reflexive responses, or to deploy attention to cope, for example, with separation from the mother. Further evidence using a delay of gratification task shows that preschool children using strategic attention deployment earlier on are able to delay gratification for a longer time later on (Eigsti et al., 2006; Mischel, Shoda, & Peake, 1988; Sethi, Mischel, Aber, Shoda, & Rodriguez, 2000). Working memory and executive attention improvements in school-age children can also predict and help in how children do in school in general. For example, changes in processing speed or increasing capacity of WMC may help children to improve strategies in problem solving and reasoning tasks (Kail, 2007) and their later overall cognitive functioning (Cowan et al., 2005; Fry & Hale, 1996; Kail & Hall, 2001).

Nigg, Goldsmith, and Schadek (2004) demonstrated, however, that a disruption in directing attention away from attention-capturing stimuli or inability to resist a salient temptation for a reward in children as young as 6–8 months might possibly indicate attention-deficit hyperactivity disorder (ADHD) or similar disorders. Research also supports the claim that toddlers not able to divert attention away from rewards in the delay of gratification task are more impulsive and exhibit poorer self-regulatory behaviors. Furthermore, they are more likely to struggle with difficulties in dealing with frustration and distractions as adolescents (Shoda, Mischel, & Peake, 1990). Therefore, attention problems and poor performance in working memory tasks in

school-age children, such as keeping track of places, managing instructions, solving mental arithmetic, or writing, are likely to be a sign of worse executive functioning later on (Diamond, 2005; Friedman et al., 2007; St Clair-Thompson & Gathercole, 2006) and possible problems with implementing and persevering in self-regulatory behaviors.

## Working Memory Capacity as Controlled Attention

Unsworth and Engle (2007) argue that individual differences in working memory capacity (WMC) originate from variations in the ability to maintain information active in primary memory while being able to successfully and efficiently search and retrieve recently active, but currently inactive, information stored in the secondary memory. Working memory capacity is important in our daily life challenges as it allows for updating and maintaining information at the same time. In fact, efficient information processing in WM, limited by the finite capacity of WM, demands the ability to maintain, update, and retrieve information relevant to the task goal while ignoring or suppressing competing information not relevant at the moment (Kane & Engle, 2002). As a result, WM requires both processing and storage resources accessed at the same time (Engle, 2002). For example, in the presence of conflicting information, one maintains current information active in short-term memory, at the same time monitoring and resolving conflict as in the Stroop task (Stroop, 1935), where saying the color in which a word is printed (a correct answer) conflicts with comprehending the meaning of the word (automatic process) that represents another color; or in the antisaccade task, where looking away from a flickering cue conflicts with our primordial drive to look at flicker since it affords movement. A basic assumption in examining individual differences in WMC is that people differ in their ability to use top-down control of attention to perform all these varied functions. These differences, furthermore, emerge in the ability to be flexible in allocation of attentional resources to relevant stimuli and to suppress inappropriate responses (Engle, 2001; Engle & Kane, 2004; Engle, Kane, & Tuholski, 1999; Kane, Bleckley, Conway, & Engle, 2001; Kane & Engle, 2002, 2003). Furthermore, WMC is a state variable that is affected by fatigue, sleep deprivation, and conditions such as stereotype threat (Schmader & Johns, 2003; Unsworth, Heitz, & Engle 2005) and the corresponding reduction in WMC would affect self-regulation and self-control.

Top-down control is important for executive attention as well as for processing and storing information. Since the ability to control attention during active processing involves both attentional and memory processes, this ability is crucial in an efficient use of available WM resources in daily life. It is important to note, however, that individual differences in WMC manifest themselves only in specific situations, such as under interference, when we have to decide among competing responses or override prepotent responses. Similarly, factors such as a high cognitive load, dealing with multiple tasks at once, or situations involving anxiety or stress, often create conflicting situations

and, therefore, require extensive use and sharing of a limited WMC between multiple components of the task (Ashcraft & Kirk, 2001; Bishop, Duncan, Brett, & Lawrence, 2004; Steele & Josephs, 1990).

In order to manage incoming information, we use both controlled (accurate but slow) and automatic (error-prone but quick) processing. Both types of processing are important in implementing self-control behaviors, focusing attention on the task, validating available information, as well as being flexible when a particular solution does not work. Controlled processing, as opposed to automated processing, requires deliberate, deep analysis of incoming information before choosing a particular response (Schneider & Chein, 2003). On the other hand, the processes just described help to resolve conflict between automatically activated information and controlled processes. The way that automatic and controlled processes operate might be illustrated by making the decision about the correct response in the Stroop task. The part of the task that involves conflict requires saying the name of the ink in which a word is printed, but not naming the word itself. Making a correct response in that instance requires employment of controlled processes. However, if the task is performed primarily using the automatically activated representation, the word would be named since it typically reaches threshold before the representation for the color name, which in this instance would be incorrect behavior. Since both working memory and self-regulation processes are involved in decision making required to achieve a goal, both may therefore share the same limited resources, especially in complex or conflicting situations. Yet these are precisely the situations where problems with self-regulation and WM are most pronounced.

## Individual Differences in Working Memory Capacity

The results of various studies examining individual differences in working memory capacity have shown that people differ in their ability to control attention across different tasks and domains (Engle & Kane, 2004; Kane & Engle, 2003; Unsworth et al., 2005). Examining individual differences usually involves dividing participants into groups of high and low WMC (and middle when the analysis involves the whole range of scores) depending on the performance on a previously administered working memory span task. Subsequently, researchers use these scores as a baseline for comparison on a target task. Research provides ample evidence that people performing poorly in WMC tasks score lower also on many other cognitive tasks. Specifically, evidence shows that low spans are usually worse at maintaining information active in memory, inhibition of irrelevant information, or updating rules after changing them (Kane et al., 2001; Miller, 2000). Under certain circumstances, however, low and high WMC spans perform at equivalent levels. One possible way to overcome the disadvantage of low spans might be extensive practice to overcome the influence of factors not allowing for efficient performance (Beilock & DeCaro, 2007).

Individual differences in WMC manifest as different behavior not only in specific situations induced in laboratory settings, but also present in everyday life. Researchers examining WM implement tasks that induce such situations, for example, competition for attention or an answer deadline as a part of the response process (Conway & Engle, 1994; Feldman-Barrett, Tugade, & Engle, 2004). WM tasks make use of the influence of proactive (and possibly retroactive) interference where previously learned information (or most recently learned, respectively) interferes with similar material activated simultaneously. Consequently it is more likely to forget material or to intermix it with interfering information. Many classic cognitive tasks that have been found to depend on individual differences in WMC require an ability to selectively attend to target information and not to interfering distractors. Similar manipulations are implemented in the dichotic listening task (Cherry, 1953), or paradigms examining the "cocktail party effect" (Conway, Cowan, & Bunting, 2001; Moray, 1959). Further manipulations focus on retrieval competition (Rosen & Engle, 1997) and situations requiring controlled search from memory, such as recall tasks including operation and reading span (Conway & Engle, 1994; Conway, Cowan, Bunting, Therriault, & Minkoff, 2002; Kane et al., 2004; Unsworth & Engle, 2007).

Complex span tasks, such as operation (OSPAN) and reading span tasks (RSPAN) involve remembering words, digits, letters, or spatial locations, interleaved with another task. Examples include reading sentences (as in RSPAN), solving math problems (as in OSPAN), counting figures, or judging figural symmetry (Daneman & Carpenter, 1980; Engle, 2002; Turner & Engle, 1989; Unsworth et al., 2005). For example, in the OSPAN task, participants judge the correctness of a mathematical equation at the same time as trying to remember a word appearing at the end of each equation. At the end of each set comprising different number of such equation–word combinations, usually two to five, participants recall words from the most recent set in the correct order.

Early research on individual differences in WMC and reading comprehension (Daneman & Carpenter, 1980) that initiated and influenced further research on individual differences in WMC revealed high correlations between scores on WMC tasks and performance on the verbal part of the SAT test. Following these findings, further research indicated that individual differences in WMC emerge in both complex and simple span tasks across various domains. Such a wide scope conveys that WMC is, in fact, a domain-general construct (Conway et al., 2002; Conway & Engle, 1996; Engle & Kane, 2004; Feldman Barrett et al., 2004; Kane et al., 2004). In the following section, we discuss studies aimed at investigating individual differences in WMC as controlled attention using the tasks described above.

## Working Memory Capacity Tasks

The family of tasks sensitive to individual differences in WMC examines the ability to inhibit a prepotent way of responding to stimuli of strong internal interference and

environmental salience. Furthermore, these tasks require maintaining a novel goal that conflicts with a strongly predisposed action or mode of functioning. We focus on three tasks: the antisaccade (Hallett, 1978), the Stroop (Stroop, 1935), and the flanker task (Eriksen & Eriksen, 1974). All three of them generally require processes engaged in the active decision-making process, such as inhibition, updating, maintaining, resisting the effects of interference, and blocking unnecessary information from entering WM. If these tasks reflect the individual differences between low and high WMC, then we can state that if WMC as attention control is important in situations of conflict and responding in favor of a less salient response, low spans should perform worse.

During each of these tasks, the participant suppresses or inhibits a prepotent response, or selectively chooses relevant information surrounded by attention-capturing, but irrelevant information. Thus the difficulty here rests within incompatible trials dealing with a choice between two alternatives. One alternative represents a prepotent choice, whereas the other one is less dominant but usually correct. For example, the antisaccade task (Kane et al., 2001; Unsworth, Schrock, & Engle, 2004) requires suppressing a prepotent, naturally salient response of looking toward a flickering visual cue and requires looking *away* from the cue instead. In contrast, a prosaccade condition intermixed with the first allows a natural reaction of looking at a changing stimulus in the environment.

The results of Kane et al. (2001) and similar results demonstrated by Unsworth et al. (2004) revealed that participants low in WMC (low spans) have more problems with suppressing the prepotent habit of looking at the flickering cue. They made more errors and were slower than participants scoring high on WMC task (high spans) on correct trials in antisaccade condition. Moreover, low WMC spans were prone to surrender to the attention-capturing stimulus. Interestingly, the groups did not differ in the prosaccade condition where the correct response was not in conflict with the habitual response of looking towards the flashing cue. The authors concluded that low spans have trouble maintaining the goal (e.g., look away from the flickering stimulus) in working memory and in managing the conflict even when the goal is actively represented in WM. Another crucial manipulation in this study involved introduction of 1 block of prosaccade trials only after participants have already had 10 blocks of antisaccade trials (Kane et al., 2001). An intriguing result of that manipulation was that low spans had substantial trouble updating the instructions to behave in accordance with a habit on that block. The results show that low spans are worse than high spans both in maintaining the goal active and in updating the goal to new instructions.

A similar interplay between the performance of low WMC spans and the ability to overcome habitual responding occurs in the Stroop task, where a conflicting situation is to name the color of the ink in which a word is printed as opposed to the more natural response of saying the word. In this task, performance differences between low and high WMC groups are most pronounced when incongruent trials appear infrequently, for example, one in four trials. Such a ratio between congruent and incongruent trials stresses the crucial importance of a need for effortful control if one wants to answer correctly. Kane and Engle (2003) found that low spans made

twice as many errors and were faster than high spans in responding to congruent trials. This situation is analogous to the one in the antisaccade task where low WMC spans experienced problems maintaining the task goals and dealing with conflict even when the goal was active (Kane et al., 2001).

Another useful task for studying conflict requiring attention control is the flanker task (Eriksen & Eriksen, 1974; Heitz & Engle, 2007). Here, participants attempt to filter out irrelevant information that would lead to an incorrect response. Heitz and Engle (2007) reasoned that if high WMC spans are better at focusing on relevant information, they should be less distracted by incompatible information. This is exactly what the authors found. High spans demonstrated better ability to focus attention on the relevant information and were faster on incongruent trials than low spans.

In sum, the studies described illustrate that individuals with high WMC are better in resisting temptation to respond in a habitual way, better at controlling attention, focusing attention on a relevant information, and better at updating the contents of working memory in case of changes in instructions. As we have seen, the crucial manipulations causing worse performance of low WMC spans in comparison to high spans were those imposing some kind of conflict, resisting effects of interference, and requiring inhibition of a prepotent response.

## Working Memory and Self-Regulation

Executive control is the ability to modify and alter one's actions and thoughts by a set of interrelated abilities (Schmeichel, 2007). As such, we expect that substantial individual differences exist in the amount of that ability, as well as emerging from changes in this ability over time, with context and with other external or internal factors. Our way of linking working memory to self-regulation is probably similar to the view represented by Schmeichel (2007) who argues that self-regulation and executive attention have limited resources and modify our thoughts and behaviors. Furthermore, Gray (2001) discusses the possibility of a joint role of working memory and emotion that could lead to more effective goal management, in that "working memory could maintain active goals, and emotional states could regulate active goals on the basis of circumstances, selectively prioritizing approach or withdrawal goals" (p. 437). Thus high WMC individuals might use different strategies than low spans with respect to cognitive control, attention, and cognitive load (Beilock & Carr, 2005; Feldman Barrett et al., 2004).

Resource depletion is yet another factor that influences regulatory processes; not only intellectual achievement but also by influencing subsequent tasks. In fact, depletion of resources needed for a subsequent, unrelated task might impair self-regulation in the latter task (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Beilock, Rydell, & McConnell, 2007; Schmeichel, 2007). Failure to focus attention or inhibit irrelevant information, or inability to resolve conflict during decision-making processes may

add to resource depletion in cognitive, social, and psychopathological (e.g., in overeating or impulsive aggressions) domains. Since both WMC and self-regulation have limited resources available for processing, they require flexibility in modifying thoughts and actions. Therefore, both WM and self-regulation might actually use the same available resource pool; and a scarce resource is subject to depletion. This depletion occurs both while performing a task under a high cognitive load and in demanding social situations.

As just noted, WMC plays an important role in information processing in cognitive, emotional, and social contexts (Redick, Heitz & Engle, 2007; Unsworth et al., 2005). How does effortful control of WM influence cognitive information processing and self-regulatory behaviors? Various factors influence our decisions because people use a wide variety of possible response styles, differ in impulsivity and reaction to feedback, and vary in regulation and control of emotional behaviors, including aggressive behaviors, anxiety, or anger (Steele & Joseph, 1990). Further issues include initiating a goal shift at different stages of information processing beyond individual differences accounted for by performance and WMC limits.

Let us look at one example as a possible implementation of the interplay between WM and self-regulation. Restrictions such as "Do not eat this cookie right now" or "You are not allowed to do that, it is forbidden" focus attention on the particular issue instead of moving attention away from a forbidden thing. Furthermore, we may speculate that individuals oriented *towards themselves* (or thinking about themselves) might have better self-regulatory mechanisms and attentional control, because they possess a finer executive control and a better filtering of irrelevant information than individuals oriented *towards others*, particularly when under high load or performing demanding task. In contrast, individuals oriented more towards others (e.g., worrying excessively about others) may have poorer self-regulation, because they may experience more thoughts that are intrusive. Thoughts that are more intrusive lead to poorer self-control and attentional control due to increased environmental distraction, especially when under a high load.

## Working Memory and Self-Regulatory Problems

As noted earlier, both self-regulation and working memory defined as executive control involve overriding a prepotent response or even a prevention of a strongly habitual response. Furthermore, this depletion of finite self-regulatory resources may cause self-regulatory failure across social situations. This failure to self-regulate manifests itself in a variety of ways. For example, stress that adds a load to cognitive processing may lead to insufficient emotional control. This lack of emotional control may express itself when a person responds aggressively. As a result, that kind of behavior counts as a sign of poor self-regulation, of being unable to restrain from a momentary need to behave aggressively. Other situations of self-regulatory failure include alcohol problems,

dependence on drugs, dependence on other people, or struggling with ruminating thoughts. For example, suppressing unwanted or negative thoughts may cause self-regulatory problems and lead to worse performance on WM tasks. Specifically, researchers have shown that high WMC spans have fewer intrusions when required to suppress their intrusive thoughts (Brewin & Beaton, 2002; Brewin & Smart, 2005; Wegner, Schneider, Carter, & White, 1987).

Anxiety- or aggression-provoking thoughts may induce negative emotions, often leading to extreme behaviors. This mechanism is similar to experiencing ruminative thoughts or delusions that represent comparable challenges to self-control (Dalgleish et al., 2007). Here, a salient detrimental thought limits inhibitory processes and diminishes accurate analysis of an actual situation (Steele & Josephs, 1990). Interestingly, people with these and similar kinds of problems having successfully overridden their "bad habit," such as overeating or obsessive drinking, often find a different "habit"—not surprisingly—replacing the old one. Thus this inability to change or update a regulatory mechanism might cause further self-regulatory problems. Other behaviors causing similar problems include emotion control or high aggression.

Imagine an alcoholic or a heavy cigarette smoker. This person might not consider drinking or smoking a problem, but treats this behavior as a habit or compensatory mechanism helping to deal with everyday problems. When that person wants to change this habit by cessation of drinking or smoking, the actual maintenance of a goal not to drink yet one more glass of wine or not to light up yet another cigarette is constantly present in working memory. Consequently, such a thought becomes salient, processed more often and with a higher strength. This mechanism inflicts a struggle in controlling thoughts. That leads to problems in self-regulation of a particular goal-directed behavior that is, in this instance, to stop drinking or smoking. In the subsections below, we look in more detail at studies examining self-regulatory behaviors and explore the relationship between self-regulatory behaviors and working memory capacity.

### *Alcohol-Related WM and Self-Regulatory Problems: The "Myopic" Effects on Attention*

Alcohol acts as an additional cognitive load, impairing goal-directed behavior, for example, performance on a cognitive task. Alcohol intoxication narrows the range of perceived cues, meaning that a person attends to and then encodes fewer internal and environmental stimuli (Steele & Josephs, 1990). One of the paradigms investigating the effects of alcohol intoxication on cognitive processing incorporates manipulation of incentives and unexpected changing in instructions. For example, Finn and colleagues (Finn & Hall, 2004; Finn, Justus, Mazas, & Steinmetz, 1999) investigated the relationship between WMC and alcohol problems in the Go/No-Go learning task where they manipulated contingencies and incentives in four groups: high or low WMC individuals with or without alcohol consumption. Manipulation of incentives

included associating a punishment and a reward with particular actions during performing a task. The critical manipulation in the Finn et al. (1999) study, however, was an unexpected change in instructions. This change involved ascribing the punishment and reward to different actions than in the earlier part of the experiment. Interestingly, switching instructions caused poorer performance of the low WMC group with alcohol ingestion. The manifestation of this lower performance was apparent in inability of low span individuals to inhibit just learned responses that became inappropriate after the contingency reversal. In a similar study, Finn, Mazas, Justus, and Steinmetz (2002) showed that low WMC participants having alcohol problems had more difficulty with inhibiting low salience cues. In other words, their attention was easily captured by infrequent cues (see also Rachlin, 2000).

Giancola and Corman (2007; see also Steele & Josephs, 1988, 1990) demonstrated that, under specific conditions, reduction of depression or anxiety is possible by directing attention away from intrusive or anxiety-provoking thoughts. Participants in the Giancola and Corman study performed a demanding cognitive task of keeping track of changing figural sequences and memorizing them for further serial order recall. The task served to direct focus of attention away from intrusive thoughts. An additional cognitive task likely occupies WMC resources but not to the extent that a person is exhausted and overwhelmed by the amount of information to process at one time. Under these conditions, less space is required for developing and maintaining anxiety or other types of intrusive thoughts actively processed in working memory (Rachlin, 2000; Steele & Josephs, 1988; but see Sher & Levenson, 1982).

Nevertheless, the amount of inhibition conflict determines whether alcohol intoxication relieves or fosters aggressive behaviors and negative thoughts (Giancola & Corman, 2007), the issue examined also in studies of alcohol "myopia" (Steele & Josephs, 1988, 1990). Alcohol myopia refers to the situation where an intoxicated person responds and reacts in a habitual and immediate way. Specifically, in Giancola and Corman's (2007) study mentioned above, participants were asked to perform a task with or without an additional task serving as a distraction. In addition, the authors analyzed whether participants' levels of aggression had changed in different distraction conditions. The number of aggressive thoughts was the same for the nonalcoholic group in both single and dual task conditions, but differed in the intoxicated group. Specifically, this group expressed less aggression in a specific distraction condition in comparison with much more aggression in a no-distraction condition. A key point here is that the intoxicated group most successfully suppressed aggression when performing a moderate-load cognitive task, whereas the influence of a difficult task had caused them to experience relapses of aggressive thoughts.

In sum, the salience of inhibitory representations and exceeding the capacity of WM increased aggression in alcohol-intoxicated group resulting in self-regulatory failure, whereas a moderate cognitive load task attenuated aggression. In the latter case, inhibitory cues acted on the behavior, leaving less capacity for processing aggressive thoughts. Steele and Josephs (1988, 1990) reported similar results in the study examining the influence of alcohol intoxication on anxiety. Intoxicated individuals were able to reduce

anxiety only if an attention-demanding task—delivering a speech—distracted them from the capture of intrusive thoughts.

### *Anxiety, Stress, and Stereotype Threat: Additional Load Depriving both WM and Self-Regulatory Resources*

As with alcohol intoxication, we may look at anxiety, stress, and stereotype threat as an additional load that consumes the resources available for WM processing, which may in turn affect the ability to self-regulate. This process may spread in a downward direction (Ashcraft and Kirk, 2001; Beilock & Carr, 2005), or conversely contribute to improving self-regulatory abilities in specific situations, for example, when under stress (Steinhauser, Maier, & Hubner, 2007). We next turn our discussion to these exact situations.

Ashcraft and Kirk (2001) examined the effects of anxiety on math performance in high and low WMC individuals. The authors reasoned that worries likely diminish performance on math problems by consuming WMC resources needed for intermediate operations, such as remembering what has been borrowed in a subtraction operation. In that case, beyond the similarities in span tasks, the central executive cannot perform at usual levels in solving complex math or mental arithmetic problems requiring intermediate operations. Indeed, high but not low math anxiety participants encountered more errors and had longer response times under increased memory load in a dual task condition. Therefore, anxiety served as a consumer of limited resources needed for solving problems.

Moreover, Beilock and Carr (2005) reported that deleterious effects of high pressure during performing a task negatively influenced only high spans. The drop in performance was so high that high and low span groups performed similarly. In another study, Beilock and colleagues (2007) showed that performance of high span individuals under a high stress was comparable to that of those with low spans, whereas low spans did not differ in their performance under stress and no-stress conditions. Beilock and Carr (2001, 2005; Beilock, Kulp, Holt, & Carr, 2004) named this below-optimal performance of high span individuals under a high pressure as "choking under pressure."

In a different study, Beilock and DeCaro (2007), attempting to find the cause of this "choking" behavior, reasoned that low WMC individuals may implement simple strategies and use shortcuts that do not always lead to the correct response or faster resolution of conflict. Conversely, high WMC individuals usually implement more complex strategies in task solving. In this study, Beilock and DeCaro examined the effects of pressure and strategy implementation in high and low WMC individuals. The results showed that those with high spans performed better under low pressure, but their performance under high pressure went down to a comparable level of the low span individuals' performance. The authors reasoned that being under a high pressure forced all participants to use simpler strategies. That is why under high pressure

the performance of high span participants deteriorated. On the other hand, high span participants performed better under low pressure conditions, because low spans had used shortcut strategies under both high and low pressure conditions.

Another factor that may act as an additional load is stress. In one study, more life-event stress correlated with poorer performance in the OSPAN task and elicited higher amount of avoidant thinking (Klein & Boals, 2001b). Specifically, more negative life stress events resulted in fewer words remembered as a set size of to-be-remembered material increased. In sum, the time pressure leading to heightened levels of stress and anxiety consumed the available WM resources, which might otherwise have been used for problem solving, such as for mathematical operations or remembering words in the introduced examples. As a result, fewer resources are available for managing self-regulatory behaviors. Thus the results of studies just described showed that stress and anxiety negatively influence cognitive performance and self-regulatory behaviors. Actually, the research shows that the influence of stress and anxiety does not always have deleterious effects on behavior and performance. Beilock and colleagues (2004) were able to reduce the effect of "choking under pressure" when participants extensively practiced the problems. Moreover, Steinhauser and colleagues (2007) demonstrated that in specific situations selective attention might improve under stress by increasing the ability to focus on the relevant information under high stress situations. The authors showed, for example, that participants, while under stress, were able to reconfigure strategies and adopt the scarce resources to the task demands while under stress. Similarly, in a stereotype threat situation, having access to additional information or a cue needed for completing the task led to comparable performance of women and men in math (Quinn & Spencer, 2001).

Stereotype threat is a widely examined topic in social psychology. Priming negative stereotypes may serve as an additional load and reduce the amount of available attentional resources. That often results in worse performance on a variety of tasks, some of them involving working memory. A popular stereotype is that women are worse than men in mathematics. Schmader and Johns (2003) proposed that WMC might be a mediator of the stereotype threat on women's performance on math test. The authors showed that making this stereotype explicit leads women to reduce their WMC. Thus active stereotype threat serves as an additional load impairing performance on a complex cognitive task. Others have demonstrated, in stereotype threat situations, that women perform worse in generating math strategies, complex words, and problem-solving strategies than men (Quinn & Spencer, 2001). In a similar vein, high prejudiced White participants interacting with another race perform worse completing the Stroop task in comparison to the situation where they interact with the same race in an interracial stereotyping paradigm (Richeson & Shelton, 2003; Trawalter & Richeson, 2006).

In fact, the results of studies just described are similar to studies examining the effect of retrieval process on WMC (Kane & Engle, 2000; Rosen & Engle, 1997). Kane and Engle (2000) demonstrated that high and low WMC individuals equated in their level of performance under high load conditions induced by a divided attention

task. Specifically, under high load induced by the requirement to perform a secondary task, high span individuals demonstrated greater proactive interference. That is, they were affected to a greater extent in their attempt to recall previously learned information, specifically material from list 1 after learning list 2. In contrast, increased load did not affect already lower performance of the low span group. Their level of proactive interference remained comparable across load and no-load conditions. The authors proposed that in order to resist the effects of proactive interference high span individuals utilized attention during both encoding and retrieval processes. That is, high spans used more controlled processes than low spans (Kane & Engle, 2000). In another examination of WMC and retrieval, Rosen and Engle (1997) found similar results. High spans outperformed low spans only during a simple retrieval task, but under divided attention both groups performed similarly. In sum, whereas low span individuals are more susceptible to interference, high span individuals utilize attention differently in comparison to low spans under divided attention by recruiting more controlled processes. That strategy makes high span individuals more prone to the effects of interference under divided attention.

### *Emotions, Mood, and Thought Suppression: A Fight for Resources between Emotion and Cognition*

Emotion regulation requires initiation or modification of emotional responses and involves various aspects of emotions. Emotion regulation mechanisms do rely, however, on attention and effortful control (Nigg et al., 2004). Examples include inhibition of emotional responses, emotion suppression, emotion exaggeration, or their influence on health as in chronic emotional suppression of feelings (Gross & Levenson, 1997). However, no straightforward relationship between cognition and emotion exists. For example, emotional stimuli may facilitate WM in situations where attending to task-relevant information is desirable. Conversely, emotional stimuli may actually worsen performance on a cognitive task in situations of unintentionally focusing attention on task-irrelevant information. Interestingly, researchers have found a negative relationship between activation of the brain structures involved in cognitive processing and the brain structures involving emotional processing (Bush et al., 1998; Ochsner, Bunge, Gross, & Gabrieli, 2002) between and within the brain structures (amygdala, medial orbital frontal cortex, caudal and dorsal anterior cingulate, prefrontal cortex).

Verbal and nonverbal material may differentially influence emotional experiences and memory (Richards & Gross, 2000). Since emotion suppression requires more cognitive resources, not surprisingly people high in expressive suppression reported more memory lapses and less accurate memories in a cued-recall memory test for film details. Researchers showed similar effects when participants exaggerated responses by making inflated emotional expressions. In a study by Schmeichel, Demaree, Robinson, and Pu (2006), response exaggeration increased emotional expressions and led to deterioration in performance on a subsequent task measuring self-regulatory capacity

independently of self-reported emotional experiences or arousal levels. Consequently, inhibiting emotional responses led to temporary reduction of regulatory strength.

We can apply the conclusions just described for alcohol intoxication, stereotype threat, stress, anxiety, and emotions to mood changes, thought suppression, and depressive states. As an example, Wegner and colleagues (Wegner, Erber, & Zanakos, 1993) showed an ironic effect of the influence of high cognitive load on mood regulation. Under a high cognitive load, participants reported moods opposite to the attempted ones. Specifically, by trying not to think about ascribed moods under a high load, they had made these moods more accessible and actually thought about them more often. This effect is similar to the famous "don't think about a white bear" paradigm (Wegner et al., 1987). In another study, depressed and nondepressed individuals imagined themselves in either positive or negative situations. Although depressed participants successfully suppressed negative thoughts, their unwanted negative thoughts had returned automatically when negative material served as a distractor (Wenzlaff, Wegner, & Roper, 1988). However, when positive distractors were introduced, these participants were able to suppress effectively unwanted negative thoughts.

Thought self-regulation also relies on the maintenance of active representation of to-be-avoided cognitions and suppression of unwanted thoughts (Bush et al., 1998; Mitchell et al., 2007). Thought suppression also influences self-regulatory processes. For example, reappraisal of negative photos may successfully diminish participants' negative affect in thought regulation (Ochsner et al., 2002). In sum, emotion and cognition influence each other, apparently by driving behaviors and competing for resources necessary for control.

### *Depression, Mood, and Other Disorders: Profound Effects of Lack of Control Resources*

Psychopathologies represent one of the extreme categories of behavior requiring self-regulation. Examples include eating disorders, depression, mood disorders, or more specifically emotion dysregulation in major depressive disorder or bipolar disorder (Demaree, Schmeichel, Robinson, & Everhart, 2004; Demaree et al., 2006). Dalgleish and colleagues (2007) showed, for example, that performance on the Autobiographical Memory Test mediated the relationship between both depressed mood and a clinical diagnosis of eating disorder. They associated these results with the impairment in executive control very often found in depression and other clinical mood disorders. Specifically, the authors reasoned that these problems observed in people with depression might be due to their diminished inhibitory capabilities. Their difficulties with maintaining the goal active in memory in the presence of distractors could exacerbate these problems. Dalgleish and colleagues reasoned that impaired performance could also stem from priming and amplifying cue words by ruminative processes. These ruminative processes likely activate schemas salient to a depressed individual but not relevant to the task at hand. Furthermore, since the interference between effortful and

automatic processing in depression depends on the severity of illness and the degree of control that tasks require, people experiencing depression may simply possess lower total cognitive capacity. This reduced capacity would diminish the effortful control, resulting in worse performance (Hartlage, Alloy, Vazquez, & Dykman, 1993).

In an analogous situation, writing about negative events may free WM resources needed for the task, improving the person's well-being. In one study, the researchers asked participants to describe their thoughts and feelings (Klein & Boals, 2001a). The group writing about college experiences improved their scores on a working memory task a few weeks later. Unrelated topic writers, however, did not show that improvement. Interestingly, those writing about their negative feelings improved their WMC and experienced a greater drop in intrusive thinking. Therefore, similar to the examples introduced earlier, life event stress is yet another factor that affects WM only when task demands are high.

### *WMC and Goal-Directed Behavior in the Brain: Additional Evidence for the Interplay Between Working Memory Capacity and Self-Regulation*

Self-regulatory problems caused by cognitive load or by neurological and psychological problems may derail successful management of working memory resources and, consequently, cause a failure in successful execution of self-regulatory behaviors. These effects may be temporary or may last longer, even a lifetime. For example, attention problems in ADHD or extensive distraction by ruminative thoughts in mood disorders prevent successful deployment of attention control and self-regulatory behaviors (Dalgleish et al., 2007). As we could see in the examples introduced earlier, stress, anxiety, fatigue, and cognitive load lead to similar effects (Beilock & DeCaro, 2007; Steele & Josephs, 1988; Steinhauser et al., 2007). However, more profound neurological changes in the brain found, for example, in schizophrenics and Parkinson's patients cause serious problems in information processing, sometimes making their normal daily life functioning impossible. At that point it is important to note that individuals with damage to the prefrontal cortex (PFC) have normal intelligence scores and are able to perform routine tasks but experience problems with everyday behavior regulation. That makes their struggle with disease yet more tragic.

Furthermore, research stresses that the more severe the disease, the more profound deficits in attention control patients with PFC damage may experience (Belleville, Chertkow, & Gauthier, 2007). Specifically, individuals with prefrontal damage, such as in mild cognitive impairment (MCI) or Alzheimer's disease, cannot override prepotent responses to engage in certain behaviors. As a result, they often react impulsively accordingly to their reflexive schemas of responding to salient sensory cues. For example, they can learn the first rule in the Wisconsin Card Sorting Test task, but then they are unable to act flexibly to incorporate a new rule, repeatedly perseverating in an old rule (Miller, 2000). Similar patterns of behaviors are observed in low WMC spans described earlier.

Engagement of the two brain areas, the PFC and anterior cingulate cortex (ACC), impose a great impact on self-control, working memory, and self-regulatory processes. Overall, lower ACC and lateral PFC activation have been associated with expressing higher anxiety for predictable threat together with less activation of the cognitive control mechanisms required for maintaining the task goals in the presence of threat-related distractors (e.g., Bishop et al., 2004; Perlstein, Elbert, & Stenger, 2002). The PFC, especially, is one of the crucial brain areas associated with higher-order cognitive processes, such as decision making, goal-directed behaviors, and complex thinking. The PFC plays an important role in executive attention and working memory across a variety of tasks involving conflict or tasks using selective attention to control the impact of interference, distraction, and inhibition of irrelevant material (Kane & Engle, 2002). Studies looking at cognitive effects of brain lesions to the PFC confirm its engagement in working memory involvement in cognitive processing and self-regulation problems.

Problems such as dysregulation of thoughts and emotions or disinhibition are prevalent in a wide range of psychopathologies and are often observed in patients with brain damage. One of the usual problems associated with PFC dysfunction is the inability to inhibit prepotent responses (Kane & Engle, 2002). Furthermore, a related mechanism, disinhibition, is also one of the characteristic impairments in ADHD and obsessive-compulsive disorder. This kind of impairment is nicely described in the definition of disinhibition formulated by Nigg, Carr, Martel, and Henderson (2007). They note that disinhibition is characterized by "speaking before one should (as in ADHD); making sudden, rash decisions, such as a major ill-advised purchase (as in mania); eating or using alcohol or drugs contrary to one's intentions or plans (as in eating disorders or substance abuse)" (Nigg et al., 2007, p. 261). It is also important to note that symptoms of both ADHD and obsessive-compulsive disorder compromise both cognitive functioning and self-regulation (Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005; Diamond & Doar, 1989; Diamond & Goldman-Rakic, 1989).

Alzheimer's patients and those with MCI manifest impairments in attention control comparable with the impairments that prefrontal patients show. Specifically, Parkinson's patients exhibit poorer planning and goal execution and poorer performance on working memory tasks in comparison with healthy controls (Altgassen, Phillips, Kopp, & Kliegel, 2007). Concluding our discussion in a more positive fashion, the encouraging message is that, in some circumstances, patients with brain damage are able to employ successful self-regulation as the following example reports. Gauggel and Billino (2007) asked participants to solve equations, mentally typing answers as fast as possible. Participants received feedback after each block and a summary of how they did after completing the task. They performed three additional blocks after a "goal setting" procedure. A specific goal was assigned to one group to "improve performance by 20%," whereas the second group was told to "do your best." The results revealed that brain-damaged patients were better at solving equations in a highly specific goal condition in comparison to the "do your best" group. Therefore, under the right circumstances, improvement in attention control and self-regulatory processes is possible and within reach.

It is difficult to talk about control of the type we have described in this chapter without ascribing properties that sound homuncular in nature. Psychologists are quite comfortable discussing the distinction between automatic and controlled processing (Posner & Snyder, 1975) and between intuitive and algorithmic qualities of mind (Feldman Barrett et al., 2004); details of how control is accomplished in a mechanistic mind and brain are typically left for later. We are no different. We have chosen to describe cognitive, emotional, and behavioral control with a place marker representing the mechanistic details of control. We are quite comfortable with an attitude of "a miracle happens here" for the details because we are convinced that an answer to these issues is close at hand. While there are theories that attempt to describe the mechanisms of control (e.g., EPIC, Meyer & Kieras, 1997), they give little hope of understanding control of the complex real world of thought, emotions, and behaviors of the type we address here. Part of the difficulty is that apparently almost any human task can be proceduralized or routinized with sufficient practice and yet nearly any novel task will force us into a more algorithmic and analytical mode of thinking and responding, at least for a short period of time. Perhaps the most optimistic approach to understanding the homuncular properties of control comes from the literature on the brain mechanisms underlying control (Chein & Schneider, 2005; Miller, 2000; O'Reilly, Braver, & Cohen, 1999). In general, this literature demonstrates that there are brain mechanisms and tracts that act dynamically under circumstances of novelty requiring control of prepotent behaviors. However, with repeated practice on even a novel task, the activation patterns change in areas known to be important to more habitual behaving (Peterson, van Mier, Fiez, & Raichle, 1998). While we are hopeful and optimistic that an understanding of the mechanisms of control is forthcoming, it remains beyond the scope of our discussion and we await the "miracle."

## Concluding Remarks

In sum, working memory and self-regulation show substantial individual differences, mostly found in situations dealing with interference or error correction. However, whereas working memory is a domain-general construct, self-regulation might be more specific, highly dependent on stimulus salience, relevance, and a situational context. For example, a person having an alcohol problem will be self-focused on regulating drinking behavior, whereas for another person alcohol will be neither a salient nor a relevant stimulus for incorporating self-regulatory behavior.

Furthermore, working memory and self-regulation share activation in some brain areas, but researchers often observe an inverse relationship in the respective brain substrates. Stress might lower activation in areas of PFC responsible for attentional control, whereas at the same time we may observe an increased activation in ACC responsible for self-regulation, for example, for emotion regulation processes.

In this chapter, we attempted to connect the research on self-regulation with WMC viewed as an active control of attention. We would argue that working memory and self-regulation use the same resources. Having limited capacity, they require effortful control and flexibility, especially under a high load in order to keep a relevant goal active in memory, update information when needed, shift attention away from irrelevant habitual response, and finally, inhibit all irrelevant information. In an attempt to relate these two constructs, we have shown that specific self-regulatory problems, such as alcohol-related problems, stress, anxiety, emotion regulation, and psychopathology might be only a few of many examples influencing both cognitive and social functioning of normal and abnormal populations. In some instances, however, ways exist for overcoming, if only partly, problems in working memory or self-regulation, such as engaging in extensive practice, setting a specific goal, or being involved in an additional, moderate activity that directs attention away from negative or unwanted issues.

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# 13

# *Regulatory Focus in a Demanding World*

**Abigail A. Scholer and E. Tory Higgins***

Why is an understanding of self-regulatory processes so important for grasping the nature of personality? We suggest that personality is revealed through motivated preferences and biases in both individuals' "ways of seeing" the world and their "ways of coping" in the world—two different kinds of sensitivities that can define personality (Higgins & Scholer, 2008). These sensitivities are most likely to be revealed in particular types of situations—in low demand situations ("out of nothing") and in high demand situations ("when the going gets tough").

Expectancies, needs, beliefs, and knowledge structures derived from past experiences affect the perception of objects, events, and other individuals in the world (e.g., Bartlett, 1932; Bruner, 1957; Kelly, 1955). As envisioned in Kelly's personal constructs theory, individuals scan the perceptual field to "pick up blips of meaning" that relate to their chronically accessible constructs (Kelly, 1955, p. 145; see also Higgins, King, & Mavin, 1982). Low demand situations, in which input is minimal or ambiguous, provide opportunities to observe how individuals' perceptions, judgments, and evaluations are shaped by their "ways of seeing" sensitivities (e.g., their chronically accessible constructs). On the other hand, high demand situations, in which an individual's self-regulatory system is taxed or stressed, provide opportunities to observe how individuals' handling of problems and pressures is shaped by their "ways of coping" sensitivities (see also Caspi & Moffit, 1993; Cox & Ferguson, 1991; Wright & Mischel 1987). Thus we argue that it's not just that personality tells us about self-regulation, it's that understanding how people self-regulate is essential to understanding personality itself.

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Given the focus of this handbook, we will emphasize the latter sensitivity—individuals' ways of coping—and the high demand situations that elicit different strategic approaches. In discussing this sensitivity, we will use regulatory focus theory (Higgins, 1997) as the primary subject of our analysis. In our discussion of regulatory focus theory, we adopt a "general principles" perspective on personality that posits that "person" and "situation" variables are simply different sources of the same general underlying principles or mechanisms (Higgins, 1990, 1999a). Rather than distinguishing between "person" explanatory principles and "situation" explanatory principles, this approach argues that the same psychological principles underlie both person and situation explanations. Consequently, studies in which regulatory focus is measured as a chronic variable *and* studies in which regulatory focus is situationally manipulated provide important insights into the nature of these regulatory systems.

We begin by reviewing regulatory focus theory in the context of the sensitivities (both "ways of seeing" and "ways of coping") that define the prevention and promotion systems. We then focus on three classes of high-demand situations that illustrate the distinct strategic ways in which promotion-focused and prevention-focused individuals cope in the world—the high-demand situations of failure, self-control conflicts, and challenges arising from membership in different social groups. In our discussion, we explore how thinking about self-regulatory hierarchies—from tactics to strategies to regulatory systems—is useful for addressing these questions and for discovering the universalities in defining personality.

## Regulatory Focus Theory

Building on earlier distinctions (e.g., Bowlby, 1969, 1973; Higgins, 1987; Mowrer, 1960), regulatory focus theory distinguishes between two coexisting regulatory systems that serve critically important but different survival needs (Higgins, 1997). The promotion orientation regulates nurturance needs and is concerned with growth, advancement, and accomplishment. Individuals in a promotion focus are striving towards ideals, wishes, and aspirations. They are concerned with the presence and absence of positive outcomes (gains or nongains) and are more sensitive to the difference between the status quo or neutral state and a positive deviation from that state (the difference between "0" and "+1") than to the difference between the status quo or neutral state and a negative deviation from that state (the difference between "0" and "−1"). In contrast, the prevention orientation regulates security needs. Individuals in a prevention focus are concerned with safety and responsibility and with meeting one's oughts, duties, and responsibilities. They are concerned with the absence and presence of negative outcomes (nonlosses or losses) and are more sensitive to the difference between "0" and "−1" than to the difference between "0" and "+1" (cf. Brendl & Higgins, 1996).

The differing concerns of the two systems also result in distinct emotional sensitivities. For promotion-focused individuals, success represents a gain and results in

cheerfulness-related emotions; failure represents a nongain and results in dejection-related emotions. For prevention-focused individuals, however, success represents a nonloss, resulting in quiescent-related emotions; failure represents a loss and results in agitation-related emotions. Consequently, promotion-focused individuals are more sensitive to emotions along the cheerfulness–dejection dimension and prevention-focused individuals are more sensitive to emotions along the quiescence–agitation dimension (Higgins, 1997; Shah & Higgins, 2001).

Importantly, although the two systems are concerned with the regulation of different needs, promotion and prevention orientations each involve *both* approaching desired end states (e.g., approaching accomplishment or safety, respectively) and avoiding undesired end states (e.g., avoiding nonfulfillment or danger, respectively). This has two important implications. First, the value or personal relevance of some desired end states may be greater in one system than the other (see Higgins, 2002). For instance, prevention-focused individuals may value the desired end state of ensuring that one's home is protected more than promotion-focused individuals. Secondly, the *same* desired end state can be represented in different ways by prevention- versus promotion-focused individuals. For example, the same desired end state (e.g., being physically fit) may be represented as a duty or responsibility for prevention-focused individuals but as an ideal or aspiration for promotion-focused individuals.

At a strategic level, differences between promotion and prevention focus relate to different preferences for using eager approach and vigilant avoidance strategies, respectively (Crowe & Higgins, 1997; Higgins & Molden, 2003; Liberman, Molden, Idson, & Higgins, 2001; Molden & Higgins, 2005). Although both promotion-focused and prevention-focused individuals can pursue the same desired end state (e.g., being physically fit), they have different preferred strategies for doing so. Thus promotion-focused individuals prefer to use eager approach strategies (approaching matches to desired end states, approaching mismatches to undesired end states), whereas prevention-focused individuals prefer to use vigilant avoidance strategies (avoiding mismatches to desired end states, avoiding matches to undesired end states). The eager strategic means preferred by individuals in a promotion focus reflect their concerns with advancement and accomplishment, their pursuit of ideals and growth, and their relative sensitivity to the difference between "0" and "+1." The vigilant strategic means preferred by individuals in a prevention focus reflect their concerns with safety and responsibility, their need to guard against mistakes, and their relative sensitivity to the difference between "0" and "−1."

As will be developed more fully throughout this chapter, these strategic preferences are enacted by the lower level tactics and behaviors that individuals adopt. These levels are independent, such that the same tactic or behavior may serve either an eager or vigilant strategy or that two different tactics may serve the same underlying strategy. For instance, a vigilant strategy may be served by either risky or conservative methods at the tactical level, and by either action or inaction at the behavioral level (Scholer & Higgins, 2008; Scholer, Stroessner, & Higgins, 2008).

Although promotion-focused individuals prefer eager strategies and prevention-focused individuals prefer vigilant strategies, this does not always mean that the strategies individuals use fit their underlying orientation, because the system level and the strategic level of self-regulation are independent (Scholer & Higgins, 2008). Situational pressures, such as a manager's instructions, as well as an individual's regulatory skills and efficacy, can impact whether individuals use the strategies that fit their underlying orientation. Regulatory fit theory (Higgins, 2000) outlines the significant implications of using strategic means that fit or do not fit one's underlying orientation. When individuals experience regulatory fit by using strategic means that sustain their underlying orientation, they "feel right" about what they are doing (Higgins, 2000) and also experience increased engagement (Higgins, 2006). Regulatory fit has been shown to affect the value of the goal pursuit activity, the value of subsequent object appraisals (Higgins, Idson, Freitas, Spiegel, and Molden, 2003), and to result in better task performance (Shah, Higgins, & Friedman, 1998). In this chapter, we explore how the principles of regulatory fit theory can be applied to understanding the effectiveness of self-regulation in different contexts.

Regulatory focus theory (Higgins, 1997) provides a clear example of how an underlying motivational system influences both "ways of seeing" and "ways of coping." In this section, we've emphasized how regulatory focus differences in "ways of seeing" are reflected in a number of different sensitivities. As envisioned in Kelly's (1955) personal constructs theory, these differences in the chronically accessible constructs of prevention and promotion-focused individuals result in distinct "blips of meaning" as they scan the perceptual field (see also Higgins et al., 1982). Prevention- and promotion-focused individuals are differentially sensitive, respectively, to the qualities of desired end states (e.g., safety vs. nurturance) and undesired end states (e.g., danger vs. nonfulfillment), to loss or nonloss information versus gain or nongain information, to the difference between "0" and "−1" versus the difference between "0" and "+1," to vigilant versus eager strategies, and to the quiescent–agitation dimension of emotions versus the cheerfulness–dejection dimension of emotions. Whereas prevention-focused individuals are more likely to encode and remember loss-relevant information, promotion-focused individuals are more likely to encode and remember gain-relevant information (Higgins & Tykocinski, 1992). Similarly, whereas prevention-focused individuals are more likely to remember information related to vigilant strategies, promotion-focused individuals are more likely to remember information related to eager strategies (Higgins, Roney, Crowe, and Hymes, 1994). Whereas individuals in a prevention focus emotionally experience failure more intensely than individuals in a promotion focus, the reverse is true for emotionally experiencing success (Idson, Liberman, & Higgins, 2000). Whereas individuals in a prevention focus are faster at appraising how quiescent or agitated an object makes them feel, individuals in a promotion focus are faster at appraising how cheerful or dejected an object makes them feel (Shah & Higgins, 2001).

As we suggested in the introductory section, these differences in "ways of seeing" will be most clearly revealed in low demand situations in which input is minimal,

ambiguous, or vague (cf. Sorrentino & Higgins, 1986). This is because such situations provide relatively few reality constraints (Kruglanski, 1996; Kunda, 1990), and thus chronically accessible promotion or prevention concerns will have a greater influence in what draws attention, what meanings are assigned, and what judgments are deemed appropriate and relevant. However, while it is low demand situations that are especially likely to reveal regulatory focus differences in "ways of seeing," it is in high demand situations that regulatory differences in "ways of coping" are most likely to be observed.

Differences in coping strategies and abilities to self-regulate emerge most clearly when individuals are placed in stressful situations. The competency demand hypothesis (Wright & Mischel, 1987) details that psychologically demanding situations reveal with particular clarity an individual's characteristics (see also Caspi & Moffit, 1993). Wright and Mischel provide an apt metaphor:

> An attribution of brittleness is not a summary statement about a generalized tendency to shatter or break; rather, it expresses a set of subjunctive if-then propositions about how the object would respond to certain situations (e.g., cracking or shattering when physically stressed). (1987, p. 1161)

While these high demand situations that stress and tax individuals certainly reveal their strategic ways of coping, we don't mean to suggest that the ways in which individuals cope in the world are not related to the ways in which individuals see the world. On the contrary, the way in which an individual sees the world will certainly influence the ways in which that individual copes in the world. For example, Jane's tendency in the middle of an argument to interpret her husband's ambiguous comment as hostile will escalate the tension and create new self-regulatory demands and challenges. Thus high demand situations, while revealing characteristic "ways of coping," are also profoundly impacted by and revealing of individuals' "ways of seeing."

## Coping in High Demand Situations

Life is hard. We pass up the chocolate cake in the pursuit of a svelte waistline. We turn down an invitation for a lovely day of hiking in order to make progress on an overdue chapter. We hold our tongue when the customer service representative fails to take responsibility for a billing error. Our heart gets broken, we break the hearts of others, we fail, we get fired, we get hired, we make new friends and resolve conflicts with old ones. But we don't all respond to life's challenges in the same ways, nor are the same strategies for self-regulation equally effective for all.

In the following subsections, we explore how prevention-focused and promotion-focused individuals respond in different ways to many of life's high-demand situations. In particular, we focus on three classes of high-demand situations: failures,

self-control conflicts, and challenges deriving from membership in social groups. There are certainly many types of high-demand situations that we could have selected. We've chosen these domains because they represent key self-regulatory challenges and because they provide an opportunity to highlight recent work in the study of regulatory focus. In the next subsections, we review not only how promotion- and prevention-focused individuals cope in strategically different ways, but also outline how the principles of regulatory fit theory (Higgins, 2000) suggest when and how individuals may be more or less effective in the task of self-regulation.

## *Coping with Failure*

"Failure, then failure! So the world stamps us at every turn" (James, 1902, p. 138). Though we do not endorse James's sentiment that failure is ever-present, some failures in life *are* inevitable. However, the stamp that failure leaves is experienced and represented very differently within the prevention versus promotion regulatory systems, whether it's a failure to meet our own standards, a failure to meet the standards of significant others, or the failure to maintain the status quo. For prevention-focused individuals, failure represents the presence of negativity and the failure to uphold a duty. In contrast, for promotion-focused individuals, failure represents the absence of positivity and the failure to attain a hoped for ideal or aspiration (e.g., Strauman & Higgins, 1987). Consequently, failure results in distinct (and different) emotional and motivational responses for prevention-focused and promotion-focused individuals. Failure also differentially engages or disrupts the system's preferred strategy (vigilance or eagerness, respectively), prompting different kinds of reactions and evaluations of progress.

*Affective responses to failure.* As we alluded to earlier, regulatory focus differences in representations of failure lead to distinctly different affective responses. Failure in a promotion focus reflects a nongain (the absence of a positive outcome) and results in dejection-related emotions like sadness and disappointment. In contrast, failure in a prevention focus reflects a loss (the presence of a negative outcome) and results in agitation-related emotions like anxiety and worry (Higgins, 1987, 1997; Shah & Higgins, 2001). Individuals not only experience acute failures (e.g., not making the cut for the soccer team), but also experience more general failures in the form of self-discrepancies, or mismatches between chronic standards or self-guides for the self and the actual self (e.g., "I'm not the athlete I dreamed I was."). These mismatches can arise between an individual's self-concept and his or her own self-standard or from mismatches between an individual's self-concept and the standard of a significant other for that person (Higgins, 1987). Furthermore, these mismatches can represent failures within the promotion system (ideal discrepancies) or failures within the prevention system (ought discrepancies).

Even when self-discrepancies ("I'm not achieving as much as I ought to be"; "I'm not as outgoing as my mother ideally hopes me to be") are made momentarily more

accessible in an indirect way, they produce distinct emotional and behavioral consequences (Strauman & Higgins, 1987). For instance, several studies have found that priming ideal (promotion) discrepancies leads to increases in dejection, whereas priming ought (prevention) discrepancies leads to increases in agitation (Higgins, Bond, Klein, & Strauman, 1986; Strauman & Higgins, 1987). While the accessibility of the self-guide and its strength or importance have been found to moderate these relations (e.g., Boldero & Francis, 2000; Higgins, 1999b; Higgins, Shah, & Friedman, 1997), these chronic failures can be activated in subtle and situational ways, impacting self-regulatory processes more broadly.

In an interesting exploration of how self-discrepancies may often be activated in our daily lives, Reznik and Andersen (2007) provide evidence that transference processes can lead to the activation of self-discrepancies associated with significant others. Work by Andersen and colleagues on the relational-self model has established that individuals are ready to use accessible significant-other representations to make sense of new individuals and social interactions (Andersen & Saribay, 2005). For instance, people express more positive affect when they engage in an interaction with a target who apparently shares similarities with a liked, rather than a disliked, significant other (Berk & Andersen, 2000) and are also more likely to behave with the "similar" target in the way they would with their significant other (Andersen & Baum, 1994; Hinkley & Andersen, 1996). Reznik and Andersen extended this work to show that the self-discrepancies associated with significant others are also activated when encountering new social targets who share features with those significant others, shaping social interactions with the target.

In one study, participants expected to interact with a target individual who resembled a parent who held a self-guide for them from which they were discrepant (Reznik & Andersen, 2007). While all individuals evaluated the target more positively when he or she had features that resembled their parent than not, they also experienced more depressed affect if they had ideal (promotion) self-discrepancies associated with that parent and experienced more hostile/agitated affect if they had ought (prevention) self-discrepancies associated with that parent. Furthermore, individuals with ought discrepancies were more likely to want to avoid interaction with the target, whereas individuals with ideal discrepancies were more likely to want to approach interaction with the target.

This work suggests the far-reaching consequences of the different kinds of failures that promotion and prevention-focused individuals are likely to experience. The experience of failure is not limited to concrete events, but can also develop when we are made aware of how we've fallen short from our own or another person's more general standards. Furthermore, when these self-discrepancies are made accessible, they aren't limited in their impact to the relevant significant other. Rather, the work by Reznik & Andersen (2007) suggests that they profoundly impact self-regulation and interpersonal regulation in other contexts as well, as when interacting with someone who simply resembles a significant other (with some individuals being more impacted by these actual significant other discrepancies than others; see Moretti & Higgins, 1999).

*Strategic impact of failure.* Failure not only produces distinct emotional responses for prevention- and promotion-focused individuals, but also has distinct consequences for promotion- versus prevention-focused individuals in terms of its effect on their preferred ways of acting on the world. For promotion-focused individuals, failure is not only negative affectively, but is also a direct threat to eagerness, the strategic orientation that sustains or fits the promotion system. The threat that failure poses to eagerness may lead either to greater attempts to bolster eagerness in the face of failure or, when failures accumulate, may lead to the demotivation of the promotion system and depression (Vieth et al., 2003). For prevention-focused individuals, failure is also affectively negative. However, for prevention-focused individuals, failure poses no threat to the system's preferred strategic orientation. Rather, failure intensifies the preferred strategic orientation of the prevention system—vigilance—by increasing anxiety and alertness. Consequently, the motivational impact of failure for subsequent performance and coping behaviors differs for promotion- versus prevention-focused individuals.

To the extent that the strategic vigilance of prevention-focused individuals can become energized through failure, prevention-focused individuals should show better performance after failure feedback. In contrast, given that that the strategic eagerness of promotion-focused individuals can become deflated after failure, promotion-focused individuals should show worse performance after failure feedback. Indeed, Idson and Higgins (2000) found that promotion-focused individuals showed a decline in performance after failure feedback relative to success feedback. Prevention-focused individuals showed the opposite pattern—better performance after failure feedback than after success feedback. However, it's not that promotion-focused individuals simply give up after failure; rather, they are likely to respond to failure in ways that protect their eagerness. For example, Förster, Grant, Idson, and Higgins (2001) found that after failure feedback, promotion performance expectancies only decreased slightly while prevention expectancies for performance decreased significantly. In order to maintain eagerness, promotion-focused individuals maintained relatively high expectancies, even after failure. In contrast, in order to maintain vigilance, prevention-focused individuals responded to failure by lowering expectancies even more.

Regardless of the absolute level of performance on a task, it's often possible to experience one's performance as either a relative failure (via upward counterfactuals or comparisons) or relative success (via downward counterfactuals or comparisons) (Roese, 1997). Given the differential impact of failure on promotion-related eagerness and prevention-related vigilance, how might the type of counterfactuals in which individuals engage make regulation of failure more effective? Two lines of research suggest that different types of counterfactuals will have distinct consequences for promotion- versus prevention-focused individuals.

Within the Reflection and Evaluation Model (REM) of comparative thinking, Markman and colleagues argue that there are four types of counterfactuals: upward and downward counterfactuals that can be either reflective or evaluative (K. Markman & McMullen, 2003). K. Markman, McMullen, Elizaga, and Mizoguchi (2006) argued that certain kinds of counterfactuals are going to be a better fit for promotion

and that others are going to be a better fit for prevention. They found that either type of upward counterfactual—evaluative (comparing current reality to a better reality) or reflective (focusing on a better reality)—are a good fit for promotion, as both upward counterfactuals have the potential to sustain eagerness by focusing on potential gains to be realized. In contrast, they found that either downward reflective counterfactuals (focusing on a worse reality) or upward evaluative counterfactuals led to better subsequent performance for prevention-focused individuals. Both of these types of counterfactuals have the possibility of increasing vigilance, either by focusing on the contrast between a better reality and the current state (making the current state feel like a failure or loss) or by bringing the possibility of a worse reality closer. Markman et al. (2006) also found that, independently of the hedonic impact of the counterfactual, using counterfactuals that fit a regulatory focus orientation produced stronger motivation (i.e., higher persistence) on a task. This suggests that individuals who naturally adopt or who are led to engage in counterfactual thinking that fits their underlying system will be better able to cope with the possibility of failure.

Indeed, prevention- and promotion-focused individuals are likely to reflect differently on past failures in other ways, too. Counterfactuals can also take the form of reversing a previous inaction (e.g., "If only I *had* done X, then Y") or of reversing a previous action (e.g., "If only I *hadn't* done X, then Y") (Roese, 1997). Additive counterfactuals, that is, counterfactuals that reverse a previous inaction that missed an opportunity for a gain, involve imagining moving from what was a "0" to a "+1" instead. In contrast, subtractive counterfactuals, that reverse a previous action that produced a loss, involve imagining moving from what was a "−1" to a "0" instead. Roese, Hur, and Pennington (1999) found that participants who considered promotion-related setbacks (their own or fictional examples) generated more additive (eager) counterfactuals, whereas participants who considered prevention-related setbacks generated more subtractive (vigilant) counterfactuals. Thus promotion- or prevention-focused individuals appear to imagine what might have been in different ways, and these past reflections not only shape the meaning of prior events but the likelihood of engaging in different future behaviors.

Across these studies, there is evidence that after failure promotion-focused individuals can engage in strategies to boost eagerness in order to counteract the demotivating impact of failure in their system. However, when promotion failures accumulate, promotion-focused individuals may become depressed. Self-systems theory (SST), a recently developed structured psychotherapy to treat depression, is based on the hypothesis that "chronic or catastrophic failure to meet promotion goals is a contributory causal factor in the onset and maintenance of depressive episodes for individuals with a promotion focus" (Vieth et al., 2003, p. 249). SST characterizes depression as a problem of motivation and goal pursuit, resulting from failures in pursuing and achieving promotion goals. Among the many goals of the treatment is to help clients reengage in promotion-focused behaviors. In a randomized trial comparing SST to cognitive therapy (Strauman et al., 2006), it was found to be more effective for

individuals with a history of lack of socialization in promotion (i.e., deficits in the promotion system). This vulnerability of individuals to depression following severe promotion-related failures is another example of how the impact of failure within the two systems has very different consequences.

*Failure below the status quo.* Generally speaking, individuals experience failure when they fall below the status quo. For prevention-focused individuals, compared to promotion-focused individuals, one might think that such failure would be less problematic because failure sustains the vigilance that fits their orientation. However, failure can be *unacceptable* for prevention-focused individuals in a way that is not true for promotion-focused individuals. Promotion-focused individuals are particularly sensitive to the presence or absence of *positive* outcomes. For a promotion-focused individual, the absence of positive outcomes may be represented by "0" (the status quo) or by "−1." While the absence of positive outcomes is problematic for a promotion-focused individual, there is no strong distinction between "0" and "−1" because *both* represent nongains; that is, it is the difference between "0" and "+1" that matters. In contrast, for prevention-focused individuals, falling below the status quo represents a serious threat to safety and security, given their relative sensitivity to the difference between "0" and "−1." Consequently, for prevention-focused individuals there is a significant difference between "0" and "−1." "0" represents the status quo (safety) while "−1" represents loss and negativity.

This difference between promotion- and prevention-focused individuals in how failure below the status quo is experienced has significant implications for the actions they are willing and motivated to take. For prevention-focused individuals, acceptable progress is measured by whether it returns them to the status quo. Prevention-focused individuals should be willing to do *whatever is necessary* to get back to the status quo. In contrast, promotion-focused individuals are motivated to make progress away from the current state, but the status quo holds no special meaning as the state they want to reach. Rather, acceptable progress is measured by whether there is advancement away from the current state towards "+1." In this sense, given a current failure *below the status quo*, promotion and prevention individuals should be willing to incur different risks in the pursuit of progress.

In support of this idea, we've found that when individuals have fallen below the status quo in a stock investment paradigm, prevention-focus strength, but not promotion-focus strength, predicts a willingness to take risks that have the possibility of returning participants to the status quo (Scholer, Zou, Fujita, Stroessner, & Higgins, 2009). After losing money and falling below the status quo, participants were given the choice between two stock options, a relatively risky option and a relatively conservative option. When the risky option was the only choice that had the potential to return participants to the status quo, individuals in a prevention focus chose the risky option. However, if the conservative option also had the potential to return them to the status quo, prevention-focused participants preferred the conservative choice. Thus, for choices below the status quo, individuals' preference for the risky option

versus the conservative option was strongly influenced when they were in a prevention focus but not when they were in a promotion focus.

This study also highlights the independence of the strategic level of self-regulation and the tactics that serve those strategies. When the tactics were equivalent in instrumentality (i.e., allowing a return to the status quo), prevention-focused participants preferred the conservative tactic that corresponded more naturally with their preferred vigilant strategy. However, when the risky tactic was the only option that could return them to the status quo, it also could be adopted to serve the vigilant strategy. Another example of the independence of the strategic and tactical levels was observed in the K. Markman et al. (2006) studies described earlier. Upward evaluative counterfactuals served, *for different reasons*, either the vigilant strategic orientation of the prevention system or the eager strategic orientation of the promotion system. A study by Werth and Förster (2007) provides a further illustration of this strategy–tactic independence. Although typically the promotion system is associated with speed (see Förster, Higgins, and Taylor-Bianco, 2003), drivers in a prevention focus judge a traffic situation as more dangerous and therefore brake earlier than people in a promotion focus Here, speed serves vigilance against danger, rather than eager advancement.

*Interim summary.* All failure is not the same. Understanding the differences between prevention-system failure and promotion-system failure can lead to more effective self-regulatory management of both self and others. For instance, attempting to increase another person's eagerness after failure ("Oh, that wasn't so bad, Champ! I know you'll do great next time!") can help promotion-focused individuals but is likely to harm prevention-focused individuals. Framing an average performance as a relative failure may increase the motivation of a prevention-focused individual, but may deflate the motivation of a promotion-focused individual. Perceiving a failure as a sign of being below the status quo may lead to greater risk-taking by prevention-focused individuals relative to promotion-focused individuals, for better or ill effect. By understanding the nature of failure within these two systems, we can begin to understand how to help individuals cope more effectively with one of the inevitabilities in life—sometimes we fail.

## *Self-Control Conflicts*

Another class of high demand situations involves self-control conflicts. The classic self-control conflict involves the tension between immediate, short-term gain (e.g., skipping that gym class in order to sleep in) and distant, long-term gain (e.g., being physically fit). However, that's not the only type of self-control conflict that individuals experience. Individuals also experience conflicts between the pursuit of two different goals (e.g., being a professional vs. being a mother) or between the use of two different strategies (e.g., coping in an eager vs. a vigilant way). In this subsection, we explore how the different concerns and preferred strategies of the prevention and promotion

systems result in different ways of coping with a variety of self-control conflicts. We also focus more directly on how the principles of regulatory fit theory can be applied to understanding these self-regulatory conflicts.

As we've discussed, eager strategies fit the promotion system and vigilant strategies fit the prevention system. When individuals use the strategy that fits their underlying orientation, it creates a state of "regulatory fit" that sustains the underlying orientation, makes individuals "feel right" about their evaluations and responses, and increases engagement (Higgins, 2000, 2006). Individuals in a state of fit perform better on an anagram task than individuals in a state of nonfit (Shah, Higgins, & Friedman, 1998) and report greater task enjoyment (Freitas & Higgins, 2002). The implications of regulatory fit theory also extend to demanding self-control conflicts, such as managing healthy behaviors and coping with life's daily challenges.

Higgins et al. (2001) demonstrated that, in a classic self-control dilemma, the strength of the promotion system was related to a preference for eager strategies (approaching matches to the desired goal), whereas the strength of the prevention system was related to a preference for vigilant strategies (avoiding mismatches to the desired goal). Specifically, participants first imagined themselves in a situation in which they are on a diet and are tempted by pizza. Individuals with a stronger promotion focus were more likely to use tactics that advanced the diet goal (approaching a match to the goal), whereas individuals with a stronger prevention focus were less likely to use tactics that impeded the diet goal (avoiding a mismatch to the goal). In other words, promotion-focused individuals were more likely to eagerly approach matches to the goal, whereas prevention-focused individuals were more likely to vigilantly avoid tactics that could impede the goal.

This scenario study supports the predicted strategic preferences of prevention- and promotion-focused individuals in a self-control conflict. Other studies, both in and outside the lab, have shown how these strategic preferences can be taken advantage of to increase the effectiveness of self-regulation. For instance, several studies have demonstrated that when health messages take advantage of the principles of regulatory fit, individuals will be more persuaded to increase their consumption of fruits and vegetables (Cesario, Grant, & Higgins, 2004; Latimer, Williams-Piehota, et al., 2008; Spiegel, Grant-Pillow, & Higgins, 2004), increase physical activity (Latimer, Rivers, et al., 2008), and reduce intentions to smoke (Kim, 2006; Zhao & Pechmann, 2007).

Messages that "fit"—either because the message fits the receivers' chronic orientation (e.g., Latimer, Williams-Piehota, et al., 2008) or because a message primes both a regulatory system (e.g., promotion) and the related strategy (e.g., eagerness) (Spiegel et al., 2004)—appear to increase the effectiveness of self-regulation through several channels. When individuals receive a message under conditions of regulatory fit, they have been shown to "feel right" about their experience of the message (Cesario et al., 2004; Cesario & Higgins, 2008), to experience greater processing fluency (Lee & Aaker, 2004), to have more positive feelings towards the focal activity (Latimer, Rivers, et al., 2008), to show greater accessibility for the message (Lee & Aaker, 2004), and to feel that it is more diagnostic (e.g., useful) for making behavioral choices (Zhao &

Pechmann, 2007). Although there is much yet to be understood about how regulatory fit can be applied most effectively in persuasive contexts (see Cesario, Higgins, & Scholer, 2007; Lee & Higgins, 2009), there is little doubt that the strategic ways in which individuals engage in self-control, and are persuaded to engage in self-control, matter for effective self-regulation.

Individuals are not only more persuaded by *messages* that fit their regulatory orientation, they are also more persuaded by *people* who fit their regulatory orientation (Lockwood, Jordan, & Kunda, 2002). For instance, whereas individuals in a promotion focus showed an increase in academic motivation when a role model highlighted eager approach strategies for achieving academic success, individuals in a prevention focus were more motivated by exposure to a role model who highlighted vigilant strategies for avoiding academic failure (Lockwood et al., 2002). Lockwood and her colleagues (Lockwood, Chasteen, & Wong, 2005) have extended this work to show that the differing health regulatory concerns of younger adults (e.g., generally more focused on promotion concerns) and older adults (e.g., focused on both promotion and prevention concerns) lead to differential motivation by positive and negative health role models. While both younger and older adults were motivated by positive health role models, older adults were also motivated by negative health role models.

Grant, Higgins, Baer, and Bolger (2007) have further demonstrated the impact of regulatory fit on the regulation of daily life problems. Grant et al. (2007) predicted that regulatory fit would increase a strategy's effectiveness by influencing the extent to which individuals would "feel right" about whatever coping strategies they used, thereby directly reducing the experience of distress. Specifically, they found that on days when participants used more coping strategies that fit their underlying orientations (i.e., eager coping strategies for promotion, vigilant coping strategies for prevention), they experienced *less* distress. Grant et al. also found that there was a significant impact of nonfit: On days when participants used more coping strategies that did *not* fit their underlying orientations, they experienced *more* distress. It is important to note that there was no main effect of promotion or prevention pride on distress; chronic regulatory orientation did not affect reactivity to stress. What were critical were the strategic ways in which individuals coped with daily stressors. While there was some evidence in this study that eager approach strategies generally led to less distress than vigilant avoidance strategies, the fit or nonfit between participants' underlying orientations and the strategy employed was especially important for well-being.

The research we have reviewed so far suggests that coping with self-control conflicts by using strategies that fit one's underlying promotion or prevention orientation generally leads to more effective self-regulation. Recent research also suggests that when individuals regulate in a state of regulatory fit, they are better able to manage subsequent self-regulatory challenges (Hong & Lee, 2008). Hong and Lee found that participants in a state of regulatory fit exhibited greater subsequent self-regulator strength (as assessed by how long they could squeeze a handgrip; see Muraven, Tice, & Baumeister, 1998) than participants in a state of nonfit. Another implication of the difference in preferred strategies for prevention- versus promotion-focused

individuals is that certain kinds of self-control temptations are an inherently better fit for one system more than the other. In some situations, prevention-focused individuals may be better able to resist temptations because avoiding obstacles to goal attainment is a preferred means of prevention-focused self-regulation. For instance, inducing a prevention focus reduces the likelihood that impulsive eaters exposed to chocolate cake will exhibit intentions to indulge (Sengupta & Zhou, 2007). Furthermore, prevention-focused individuals even enjoy a task that requires resisting tempting diversions more than promotion-focused individuals (Freitas, Liberman, & Higgins, 2002).

However, Dholakia, Gopinath, Bagozzi, and Nataraajan (2006) have shown that with regard to some temptations, promotion-focused individuals may be better able to engage in self-control. Dholakia et al. found that while promotion-focused individuals reported a greater desire for the tempting object, their use of strategies focused on approaching the long-term goal resulted in greater effectiveness than the avoidance strategies employed by prevention-focused individuals. It seems likely that the nature of the self-control conflict constrains what type of strategy is most advantageous. Some types of self-control conflicts will "fit" a promotion orientation better and some types of self-control conflicts will "fit" a prevention orientation better. Understanding the differences between these two situations that result in different optimal strategies for dealing with temptations is an important subject for future research.

Up until now, we've focused primarily on the benefits of regulatory fit for increasing the effectiveness of self-regulation. We wrap up this subsection on self-control conflicts by considering the *trade-offs* of regulatory fit: When might regulatory nonfit lead to more effective self-regulation than regulatory fit? This exploration requires us to consider the self-regulatory demands of particular tasks and to reflect more deeply on what it means to be in a state of nonfit.

Two recent programs of research suggest the importance of taking into account the demands of the task when considering the effects of regulatory fit. In a series of studies, Vaughn, Malik, Schwartz, Petkova, and Trudeau (2006) have shown that regulatory fit influences the stop rules that individuals employ when deciding whether to continue exerting effort on a task. When individuals are in a context that elicits an enjoyment stop rule (intrinsic task-focused rule), regulatory fit results in greater effort, due to the increased motivational intensity and the feeling of rightness about one's evaluation of the task. However, when individuals are in a context that has an explicit, sufficiency-based stop rule, regulatory nonfit results in greater effort, due to the feeling of wrongness. Thus regulatory fit may lead to either greater or lesser investment of effort depending on how the stop rules for the task are construed. Another example of an interaction between task demands and regulatory fit has been shown by Maddox, Baldwin, and A. Markman (2006). Their work assumes an additional consequence of regulatory fit that we've not yet directly discussed – that regulatory fit appears to increase cognitive flexibility (A. Markman, Maddox, Worthy, & Baldwin, 2007). However, the impact of increased cognitive flexibility on effective self-regulation depends on the task demands. In support of this idea, Maddox et al. demonstrated that individuals in a state of regulatory fit performed better on a classification learning

task that required cognitive flexibility, but performed worse on a classification learning task in which cognitive flexibility was disadvantageous. Together, these studies make clear that when considering the effects of regulatory fit on self-regulation, one must also consider the demands of the task.

### *Intergroup Interactions*

One of the challenges of self-regulation is that it's not just about the self. Self-regulation also involves regulation in a social context, one that includes interactions with members of one's own groups and other groups. In this final subsection, we discuss how regulatory focus impacts self-regulation in another type of high-demand context: intergroup interactions. We use the term "interactions" loosely to include situations in which an individual's group membership or differences between groups are made salient, even if no direct interaction is expected. In particular, we examine how regulatory focus is related to differences in responses to challenges on the basis of group membership, to differences in the kinds of groups that individuals value, and to how self-regulation is impacted by the collective regulatory focus of groups.

*Response to challenges.* When individuals are members of a group for which clear negative stereotypes exist, individuals are vulnerable to the potential for social discrimination. Individuals are also vulnerable to stereotype threat, a challenge to performance on the basis of negative stereotypes about their group in a particular achievement domain (Steele & Aronson, 1995). These situations represent high-demand situations that require self-regulatory responses in order to perform well and cope successfully with potential discrimination. A series of recent studies has examined how regulatory focus might interact with and impact the unfolding of such challenges.

Stereotype-threat theory (Steele, 1997) outlines how performance suffers when a negative stereotype is activated in a performance situation that is relevant to the individual. Seibt and Förster (2004) proposed that the activation of negative stereotypes might elicit a prevention focus and that the activation of the prevention system might result in a distinct pattern of performance strengths and deficits. In particular, Seibt and Förster (2004) argued that the increased activation of the prevention system following the awareness of the negative stereotyping of one's group in a relevant performance situation would lead to a vigilant processing style and a focus on minimal goals. However, this increased activation of the prevention system should also lead to increased accuracy, consistent with prevention system concerns and the findings of previous studies (see Förster et al., 2003). They found that on certain kinds of tasks, activation of negative stereotypes did lead to slower, more accurate performance. However, the activation of negative stereotypes also led to *poorer* performance on tasks that required creative, eager processing. Given that the types of achievement tasks often examined in the stereotype threat context are difficult and require the transfer of knowledge and/or creative solution generation, and given that previous studies have found that a

prevention focus reduces creative performance compared to a promotion focus (Crowe & Higgins, 1997; Friedman & Förster, 2001), an increased prevention focus under negative stereotype conditions is likely to have a detrimental effect on performance. However, Keller (2007) has shown that if a promotion focus, rather than a prevention focus, can be induced under stereotype threat conditions, the negative impact of stereotype threat can be reduced. Keller argues that when individuals are in a promotion focus, stereotype threat is more likely to be experienced as a challenge, rather than as a threat, leading to greater eagerness and engagement in one's maximal goals (and thus better performance) (see also Brazy & Shah, 2006).

It seems that negative stereotype threat, generally speaking, is likely to induce a prevention focus and that a prevention focus can leave individuals more vulnerable to the insidious effects of stereotype threat when the performance task is difficult. More generally, whether discrimination is unambiguous (Sassenberg & Hansen, 2007) or ambiguous (Oyserman, Uskul, Yoder, Nesse, & Williams, 2007), the prevention system is associated with greater sensitivity to the potential for social discrimination. Individuals primed with a prevention focus are more likely to evaluate an ambiguously unfair work scenario as unfair and are more likely to report that they would engage in some kind of situation-focused action to address the perceived injustice (Oyserman et al., 2007). Following social discrimination, individuals in a prevention focus experience more resentment and anger than promotion-focused individuals, and, as found in the Oyserman et al. study, show an increased motivation to act against the discriminatory judgment (Sassenberg & Hansen, 2007). Two mechanisms appear to contribute to this greater sensitivity. Oyserman et al. have argued that since signs of potential threat or danger are likely to cue the prevention system, simply making an individual's stigmatized identity salient increases vigilance in the prevention system. Sassenberg and Hansen additionally found that even when social discrimination was framed as a nongain, individuals tended to perceive it as a loss, which may also partly underlie the strong prevention response. Prevention-focused individuals respond more strongly to negative events (seen as losses) than do promotion-focused individuals, for whom negative events represent nongains (Idson et al., 2000).

In both studies, the prevention system was associated with taking *greater* action following perceived social discrimination. It seems likely that, in both of these situations, prevention-focused individuals perceived themselves in an unfair situation, below the status quo. They were consequently willing to do whatever was necessary to resolve it, including taking even risky actions (e.g., confronting a superior). While these studies suggest that promotion- and prevention-focused individuals will respond differently to discrimination or the potential for discrimination, they cannot tell us how this results in ultimately more or less effective coping. For instance, if the treatment is actually unfair, being in a prevention focus and being motivated to take action could be a good thing. However, if it's a misperception or if an individual is in no position to truly "speak truth to power," being in a prevention focus could be more detrimental. These questions suggest new possibilities for exploring the consequences of these different regulatory responses across different contexts.

*The groups we value.* Individuals can be associated with some groups regardless of their own preferences. However, we have choices about whether to belong to many other social groups. And regardless of whether we've chosen our membership in a group or not, we value some groups more than others. Recent work suggests that the value of groups may be derived, in part, from the group's ability to meet our regulatory needs. Sassenberg, Jonas, Shah, and Brazy (2007) found evidence that promotion-focused individuals explicitly and implicitly value high power groups more than prevention-focused individuals and that prevention-focused individuals explicitly and implicitly value low power groups more than promotion-focused individuals. They argue that high power groups provide a better fit for individuals in a promotion focus because they allow promotion-focused individuals to engage in the strategies that feel right to them—eagerly pursuing nurturance and accomplishment—whereas low power groups provide a better fit for individuals in a prevention focus because they allow prevention-focused individuals to engage in the strategies that feel right to them—vigilantly maintaining safety and security.

Furthermore, while promotion-focused and prevention-focused individuals may be attracted to different types of groups because these groups allow individuals to engage in their preferred strategies, the collective regulatory focus *of groups* can also influence the self-regulation of individuals. For instance, groups primed with promotion versus prevention concerns exhibit strategic convergence towards the primed system; promotion groups show a liberal bias in a recognition memory task whereas prevention groups show a conservative bias (Levine, Higgins, & Choi, 2000; see also Florack & Hartmann, 2007). Recent work has also shown that even in a minimal group paradigm, the collective regulatory focus of the group (as indicated by the mottos that the group endorses) affected individuals' behavior on an independent task, particularly for individuals who were highly identified with the group (Faddegon, Scheepers, & Ellemers, 2007). This work suggests that when considering the implications of regulatory focus in intergroup contexts, it will be important to explore both how different groups serve important regulatory functions and how different groups shape the regulatory concerns of their individual members.

## Concluding Remarks

When facing any of the many challenges that life throws our way, being in a prevention versus promotion focus has significant implications for how the challenge will be confronted. These high demand situations reveal differences in ways of coping that result from fundamental differences in the motivations and strategic orientations of the promotion versus prevention systems. Vigilant strategies "fit" the prevention system and eager strategies "fit" the promotion system. Although this system–strategy fit is consistent across contexts, the relations between eager and vigilant strategies and the tactics and behaviors that serve them are far more complex. Vigilance results in

increased riskiness in some cases and in increased risk aversion in others (Scholer et al., 2008). The same counterfactual (upward evaluation) can fit an eager promotion strategy or a vigilant prevention strategy (K. Markman et al., 2006). The same fast reaction can serve promotion eagerness or prevention vigilance (Werth & Förster, 2007). More generally, more than one tactic can serve the same system, or the same tactic can serve both systems. What does this suggest about the universals in personality?

We argue that, rather than classifying and describing personalities on the basis of behavioral variability per se, coherence will be found by asking, "What motivational system and its strategic preferences is this behavior serving?" (see Higgins, 2008; Higgins & Scholer, 2008). Recent research (Higgins, 2008; Higgins, Pierro, & Kruglanski, 2008) examining cross-cultural differences in regulatory focus (Higgins, 1997), regulatory mode (Higgins, Kruglanski, & Pierro, 2003), the Big Five trait dimensions (see John, 1990; John & Srivastava, 1999), and self-esteem (Rosenberg, 1965) suggests some of the advantages of approaching personality in this way.

As an example, while some countries tend to have higher self-esteem than others, such as the United States relative to Japan, the functional relations between the underlying motivations of regulatory focus and self-esteem are consistent across countries. For instance, across all countries studied by Higgins et al. (2008), higher self-esteem was associated with higher promotion focus. For individuals high in promotion, self-esteem serves to sustain eagerness and boost optimism, which is critical for promotion functioning. In contrast, for functional reasons, individuals high in prevention would tactically dampen their optimism and confidence to remain vigilant. These differences in adaptive, tactical self-regulation would result in self-esteem being higher for individuals high in promotion than individuals high in prevention. Although *both* the United States and Japan have some individuals who are high in promotion and some who are high in prevention, the relative distributions of such individuals in each nation varies. The United States has more predominant promotion individuals than Japan, whereas Japan has more predominant prevention individuals than the United States (Higgins et al., 2008). Given the functional relations between promotion and prevention and self-esteem, one would predict that overall, self-esteem would be higher in the United States than in Japan. Indeed, this is what was found by Higgins et al. (2008). Thus cross-cultural differences in self-esteem, as well in other traits (e.g., extroversion), can be understood as deriving from the fact that different traits serve different motivational orientations and their preferred strategies, with these functional relations being universal but the distributions of predominant orientations varying cross-culturally (see Higgins, 2008).

Individuals deal with life's demands in distinctly different strategic ways depending on their regulatory state. Neither regulatory state is better than the other; there are self-regulatory trade-offs within each system. These trade-offs are reflected in the general sensitivities and preferred coping strategies of the promotion versus prevention systems, and also in the trade-offs related to being in a state of regulatory fit versus nonfit. While individuals can be chronically promotion-focused or prevention-focused, these regulatory states can also be temporarily induced or strengthened situationally.

This suggests exciting possibilities for designing interventions that capitalize on the strengths of a given system in specific situations. We hope that self-regulation will become as much a study of the way individuals triumph over the demands they face as of how they struggle.

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# 14

# *Self-Efficacy*

**James E. Maddux and Jeffrey Volkmann**

Self-efficacy beliefs are concerned with people's perceptions about their ability to "organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Thus self-efficacy theory and research are concerned with people's ability to engage in successful self-regulation.

The study of self-efficacy beliefs is not really new. Philosophers (e.g., Spinoza, Hume, Locke, Ryle) have been concerned with human agency, self-control, and "the will" for quite some time (Russell, 1945; Vesey, 1967). Psychologists have also devoted a lot of attention to these constructs. For example, effectance motivation (White, 1959), achievement motivation (McClelland, Atkinson, Clark, & Lowell, 1953), locus of control (Rotter, 1966), learned helplessness (Abramson, Seligman, & Teasdale, 1978), are all concerned with beliefs about personal agency and the effect of these on psychological well-being and achievement (see also Skinner, 1995).

Most of these models did not draw a clear distinction between beliefs about the effect of specific behaviors on desired outcomes and beliefs about the ability to execute the behaviors that might lead to desired outcomes. One of Bandura's (1977) most important contributions was to provide clear definitions of these notions and build them into a comprehensive theory, thus providing a foundation for their scientific examination.

The goal of this chapter is to provide an overview of self-efficacy theory and how self-efficacy beliefs are an important component of self-regulation. It is not the purpose of this chapter to provide reviews of the research on the vast array of topics that have been studied using self-efficacy theory. Readers interested in such reviews can consult a variety of other sources (health behavior, Bandura, 2004; recovery from trauma, Benight & Bandura, 2004; substance abuse, Oei & Morawska, 2004; education, Ogah, 2006: effective parenting, Jones & Prinz, 2005, preventing disability: Marks,

Allegrante, & Lorig, 2005; career and vocational assessment, Gainor, 2006; education, Goddard, Hoy, & Woolfolk Hoy, 2004).

Before discussing the role of self-efficacy beliefs in personality on self-regulation, it is first necessary to provide an understanding of what self-efficacy beliefs are, how they develop, and how they may be influenced by personality.

## Defining Self-Efficacy

Self-efficacy beliefs are beliefs about *competencies*—what we know about the world and what we know how to *do* in the world. Competencies include "the quality and range of the cognitive constructions and behavioral enactments of which the individual is capable" (Mischel, 1973, p. 266) and the ability to "construct (generate) diverse behaviors under appropriate conditions" (Mischel, 1973, p. 265). Self-efficacy beliefs are appraisals of our ability to use our competencies in specific domains and situations. (See also Mischel & Ayduk, 2004; Cervone, Mor, Orom, Shadel, & Scott, 2004.) In addition, self-efficacy beliefs are not decontextualized appraisals of competencies divorced from situations; they are, instead, beliefs about what we can do with our skills and abilities in certain contexts and conditions.

It is especially important to distinguish between self-efficacy beliefs and *outcome expectancies* (Bandura, 1997) or *behavior-outcome expectancies* (Maddux, 1999a). An outcome expectancy is the belief that a particular behavior will produce a particular result under particular conditions. Outcomes expectancies, therefore, are an important aspect of what are usually referred to as *plans* or *strategies* in theories of self-regulation. A self-efficacy belief is concerned with one's confidence in one's ability to execute the behavior in question under the conditions in question—that is, one's confidence in one's ability to implement plans and strategies. In other words, outcome expectancies are means–end relations, while self-efficacy beliefs are agent–means relations (Cervone et al., 2004).

Rather than viewing self-efficacy as a construct that has different "types," it is better to view it as a construct whose measurement can be tailored for different types of behaviors and for different types of domains and situations. For example, "self-efficacy for condom use" could have two very different meanings. One could have strong sense of self-efficacy for "putting on a condom" but a weaker sense of self-efficacy for "using a condom during sex." Putting on a condom—or putting one on someone else—is not a difficult thing to do. However, persuading a reluctant partner (or oneself) to stop during the heat of a passionate encounter and put on a condom demands complex social and self-regulatory skills (e.g., Siegel, Mesagno, Chen, & Christ, 1989). Self-efficacy beliefs for these behaviors do not represent different "types" of self-efficacy but instead self-efficacy beliefs for very different behaviors.

## Sources of Self-Efficacy Beliefs

The ability to self-regulate begins in infancy and develops throughout childhood through the complex interaction of temperament and experience (McCabe, Cunnington, & Brooks-Gunn, 2004; Eisenberg, Eggum, Sallquist, & Edwards, this volume). Although assessing self-efficacy beliefs in infants and young children would be a difficult task, rudimentary self-efficacy beliefs probably begin developing along with rudimentary self-regulatory abilities. Infants of a few months old demonstrate some rudimentary awareness of cause-and-effect relationships (outcome expectancies) (Leslie, 1982; Mandler, 1992); therefore, it stands to reason that they also can development rudimentary self-efficacy beliefs or agent–means expectancies. Because self-efficacy beliefs are appraisals of agent–means relationships, the early development of such beliefs will be influenced by the development of the capacity for symbolic thought: the development of a sense of a "self" that is separate from one's environment, including other people; and the environment's responsiveness to one's behavior, in particular the responses of parents and other powerful adults. Research on *effortful control*—"the ability to willfully or voluntarily inhibit, activate, or change (modulate) attention and behavior" (Eisenberg, Smith, Sadovsky, & Spinard, 2004, p. 260)—suggests that individual differences in self-regulatory ability may be grounded to some extent in biological systems. Because effortful control seems to be "involved in awareness of one's planned behavior and subjective feelings of voluntary control of thoughts and feelings" (Eisenberg et al., 2004, p. 260), children who are higher in effortful control are likely to develop strong self-efficacy beliefs more easily than children who are lower in this capacity.

People develop self-efficacy beliefs by integrating information from five sources: performance experience, vicarious experience, imaginal experience, verbal persuasion, and affective and physiological states. Self-efficacy beliefs are most strongly influenced by our own *performance experiences* (Bandura, 1977, 1997). When our attempts at control are successful, self-efficacy for that behavior or domain is usually strengthened. When we fail, self-efficacy is usually diminished. Observations of the behavior of others and the consequences of that behavior—vicarious experiences—also can influence self-efficacy beliefs because we use observations of others to form expectancies about our own behavior and its consequences.

*Imagining* ourselves behaving effectively or ineffectively in hypothetical situations can also influence self-efficacy beliefs (e.g., Wesch, Milne, Burke, & Hall, 2006), such as when a psychotherapist employs interventions that rely heavily on imagery, such as systematic desensitization and covert modeling (Williams, 1995).

What others say to us about our abilities and probability of success also can influence our self-efficacy beliefs. The power of verbal persuasion to influence self-efficacy beliefs depends on such source factors as expertness, trustworthiness, and attractiveness, as decades of research on verbal persuasion and attitude change has demonstrated (e.g., Eagly & Chaiken, 1993).

*Physiological and emotional states* can affect self-efficacy if we come to associate poor performance or perceived failure with unpleasant physiological arousal and success with pleasant emotions. When I am anxious, for example, I am more likely to doubt my abilities. Likewise, if I feel calm, I am more likely to feel confident in my ability to perform effectively.

## Self-Efficacy and Personality

A discussion of self-efficacy and personality must address two questions: (a) Is there a personality trait called *general self-efficacy*? and (b) How is the development of self-efficacy beliefs influenced by personality?

Self-efficacy, as noted previously, is not defined and measured as a personality trait. As Stajkovic and Luthans (1998) stated, "Decontextualizing specific efficacy expectations replaces them with abstract beliefs (general self-efficacy) that then become incongruent with the defined premises of social cognitive theory" (p. 244). Of course practically any psychological construct can be defined and measured along a dimension of specificity (situation- or domain-specific) and generality (more or less trait-like). Self-efficacy is no different in this regard. Therefore, although the notion of trait-like self-efficacy is inconsistent with the original theory, measures of general or trait self-efficacy have been developed and have been used frequently in research (e.g., Sherer et al., 1982; Schwarzer & Jerusalem, 1995; Chen, Gully, & Eden, 2001; see Scherbaum, Cohen-Charash, & Kern, 2006 for a comparison of psychometric properties of these three frequently used general self-efficacy scales). For the most part, general self-efficacy scales have not shown predictive value above that of domain-specific self-efficacy measures (Martin & Gill, 1991; Pajares & Johnson, 1994). In addition, research suggests that scales designed to measure the presumably different constructs of generalized self-efficacy, self-esteem, neuroticism, and locus of control are measuring a single factor or construct (Judge, Erez, Bono, & Thoresen, 2002).

Self-efficacy beliefs also can generalize from one situation or task to another, depending on the similarities between the task demands and the skills and resources required to meet those demands (e.g., Samuels & Gibb, 2002; Weitlauf, Cervone, Smith, & Wright, 2001). In addition, research has shown that general self-efficacy beliefs can be enhanced through targeted interventions (e.g., Eden & Aviram, 1993).

Self-efficacy beliefs also may become relatively stable over time. The stability of self-efficacy beliefs for specific performances and specific domains depends on the individual's experiences with those performances and domains, specifically the degree to which the individual views his or her performances as relatively successful or unsuccessful and attributes success to personal capabilities and effort. However, these are not justifications for assuming that self-efficacy beliefs in a specific domain emanate from a trait-like general self-efficacy.

The most important question is not "Is there a personality trait called *general self-efficacy*"? but "How useful is it to view self-efficacy as a trait?" If our goal is to understand the *process* of self-regulation, then viewing self-efficacy as a belief or expectancy as a component of self-regulation that interacts with other components of self-regulation will be more useful than viewing it as a trait (an issue that we will return to below).

Although self-efficacy is not a personality trait, the capacity for developing strong self-efficacy beliefs may be influenced by personality. As noted previously, children who are higher on effortful control (which, as an aspect of temperament, can be viewed as a personality trait) may develop strong self-efficacy beliefs more easily than children who are lower in this capacity.

Research on the five-factor model of personality also suggests that certain people may be more predisposed than others to develop strong self-efficacy beliefs. McCrae and Löckenhoff (this volume) suggest, for example, that people high in conscientiousness (which includes the components of deliberation, organization, and achievement orientation) are likely to set more explicit and more challenging goals. Because setting explicit and challenging goals is associated with goal attainment, and because goal attainment enhances self-efficacy beliefs, people who are higher in consciousness seem predisposed to develop strong self-efficacy beliefs more easily than people who are lower in this trait. McCrae and Löckenhoff (this volume) also suggest that people higher in achievement orientation, an aspect of conscientiousness, also may respond more vigorously to detected discrepancies between a desired state (goal) and a present state of affairs. Responding vigorously to detected discrepancies is likely to increase the probability of success, which is conducive to the development of strong self-efficacy beliefs.

They also suggest that people higher in neuroticism—because they are motivated largely to avoid failure and dejection—may set goals that are poorly defined and less challenging than do people lower in neuroticism. Poorly defined and less challenging goals are less likely to be attained and therefore are less likely to result in stronger self-efficacy beliefs. They note that a meta-analysis by Judge and Ilies (2002) did indeed find that higher conscientiousness, higher extraversion, and lower neuroticism are associated with setting more challenging goals in task and job performance.

Little, Lecci, and Watkinson (1992) found that people who were lower in neuroticism viewed their personal goals as less stressful and more meaningful and felt more efficacious about goal attainment. People higher in extraversion and conscientiousness also reported stronger self-efficacy beliefs regarding their goals.

Because neuroticism is associated with rumination, including a focus on threats to the self (McCrae & Löckenhoff, this volume), people higher in neuroticism are probably more likely to become critically self-diagnostic ("What's wrong with me?") rather than task-diagnostic ("What do I need to do now?") when encountering self-regulatory challenges and setbacks. Task-diagnostic behavior is more likely to lead to success and therefore to strengthen self-efficacy beliefs (Bandura & Wood, 1989; Wood & Bandura, 1989).

People higher in conscientiousness are less likely to procrastinate, more likely to persist in the face of challenges, and better able to delay or suppress gratification than are people lower in conscientiousness (McCrae & Löckenhoff, this volume). Individuals who are *both* high in conscientiousness and low in neuroticism tend to have clear goals and tend to persist under unfavorable conditions (McCrae & Löckenhoff, this volume). Setting clear goals, persisting under challenging conditions, delaying gratification, and not procrastinating increase the probability of success and therefore the probability that self-efficacy beliefs will be enhanced.

Much research remains to be done before firm conclusions can be drawn about the relationship between personality and self-efficacy. Research suggests, however, that people higher in conscientiousness, higher in extroversion, and lower in neuroticism more easily develop strong self-efficacy beliefs.

## Self-Efficacy and Self-Regulation

Understanding the role that self-efficacy beliefs play in self-regulation requires understanding of the broader theoretical foundation. Self-efficacy theory is best understood in the context of *social cognitive theory*—an approach to understanding human cognition, action, motivation, and emotion that assumes that people actively shape their environments, rather than simply react to them (Bandura, 1986, 1997, 2001; Barone, Maddux, & Snyder, 1997). Social cognitive theory is grounded in the assumption that people have powerful cognitive or symbolizing capabilities that allow them to create internal models of experience. Because of this capacity, people can observe and evaluate their own thoughts, behavior, and emotions; develop new plans of action; make predictions about outcomes (expectancies); and test and evaluate their predictions. In addition, environmental events, inner personal factors (cognition, emotion, and biological events), and behaviors are reciprocal influences. People respond cognitively, emotionally, and behaviorally to environmental events. Also, through cognition, people can exercise control over their own behavior, which then influences not only the environment but also their cognitive, emotional, and biological states.

These capacities set the stage for self-regulation. At the heart of self-regulation is the ability to anticipate or develop expectancies—to use past knowledge and experience to form beliefs about future events or states, one's abilities, and one's behavior. Self-efficacy's effect on self-regulatory ability is the aspect of self-efficacy that has the greatest influence in people's lives.

Because self-regulation refers to a set of "processes by which people control their thoughts, feelings, and behaviors" (Hoyle, 2006, p. 1507), understanding self-regulation consists of not just understanding who self-regulates well and who does not—"stable tendencies to self-regulate in particular ways or with characteristic levels of success or failure" (Hoyle, 2006, p. 1508). It consists also of understanding the *process* of self-regulation or *how* people self-regulate. A social cognitive approach to self-regulation

is concerned specifically with understanding the process of self-regulation, not simply measuring individual differences in general self-regulatory ability (Karoly, this volume; Cervone, Shadel, Smith, & Fiori, 2006). In fact, a social cognitive approach to self-regulation assumes that self-regulation consists of a set of skills that can be learned and improved with practice, while recognizing that there are individual differences in the capacity for mastering these skills that may be grounded in personality and therefore to some extent in biology (e.g., effortful control, Eisenberg et al., this volume; conscientiousness, McCrae & Löckenhoff, this volume).

Self-regulation is a complex process involving reciprocal relationships among a number of components. For this reason, self-efficacy beliefs interact in complex ways with the other major components of self-regulation.

Self-efficacy beliefs influence the *goals* people decide to pursue. The higher one's self-efficacy in a specific achievement domain, the loftier will be the goals that one sets for oneself in that domain (e.g., Bandura, 1997). Motivation to accomplish difficult tasks and accomplish lofty goals is enhanced by overestimates of personal capabilities (i.e., positive illusions, Taylor & Brown, 1988), which then become self-fulfilling prophecies when people set their sights high, persevere, and then surpass their previous levels of accomplishments.

In addition, the goals people choose may influence self-efficacy beliefs. For example, people view *avoidance goals* (things they want to avoid) as less clearly defined than *approach goals* (things they want to attain) and as having less clearly defined strategies for attainment (Cervone et al., 2004; Mor & Cervone, 2002). Therefore, people usually have a lower sense of self-efficacy for accomplishing avoidance goals than for accomplishing approach goals (Cervone et al., 2004; Mor & Cervone, 2002).

Self-efficacy beliefs influence people's choices of goal-directed *plans* or *strategies* (Bandura, 1998). People are more likely to attempt to implement plans they believe they can implement competently than plans that they believe are beyond their abilities. They are also less likely to procrastinate at goal-directed behavior when their self-efficacy beliefs are relatively strong (Steel, 2007). As Mischel and Ayduk noted:

> The motivation to delay immediate gratification for the sake of distal goals that are contingent on the individual's own effort also depends on the activation of beliefs that one can fulfill the necessary requirements . . . on which the distal reward is contingent. (Mischel and Ayduk, 2004, p. 105)

Thus, as people contemplate a goal and make attempts at self-regulation in pursuit of that goal, they not only consider what behaviors and strategies are necessary to attain the goal (including specific subgoals in specific situations), but they also consider to what extent they believe they can perform those behaviors and implement those strategies.

Self-efficacy beliefs influence *intentions* to attain particular goals and intentions to engage in particular goal-directed behaviors, plans, or strategies. Of particular relevance to self-regulation are *implementation* intentions—intentions to perform specific

goal-directed behaviors in specific situations (Gollwitzer, Fujita, & Oettingen, 2004). Intentions are influenced by a number of factors, including, but not limited to, self-efficacy beliefs (Maddux, 1999a; Maddux & Ducharme, 1997). Self-efficacy beliefs can influence self-regulation through their influence on intentions because people are unlikely to hold strong intentions to perform behaviors if they lack confidence in their ability to perform them (Bandura, 1997; Maddux & Ducharme, 1997).

Self-efficacy beliefs can influence and can be influenced by *causal attributions*. Causal attributions are explanations for events, including one's own behavior and its consequences. Attributions are important in self-regulation because people's explanations for the success or failure of their self-regulatory efforts can determine their subsequent responses (e.g., increased or diminished effort). Self-efficacy beliefs can influence attributions and vice versa because beliefs about competencies can influence explanations of success and failure, and because explanations for success and failure will, in turn, influence perceptions of competence. For example, people with strong self-efficacy beliefs for an activity are more likely than people with weak self-efficacy beliefs to attribute success in that activity to personal capabilities rather than to external factors (Bandura, 1989; Schunk, 1995). Attributing success to personal capabilities is more likely to lead to persistence in self-regulatory efforts than is attributing success to external factors.

People who are pursuing long-term goals (e.g., getting a PhD) are frequently faced with complex problems and difficult decisions; therefore, effective self-regulation requires efficient and effective problem solving and decision making. Self-efficacy beliefs can influence the efficiency and effectiveness of problem solving and decision making. When faced with complex problems and difficult decisions, people who have confidence in their ability to solve problems and make decisions use their cognitive resources more effectively than do people who doubt their cognitive skills (e.g., Bandura, 1997; Cervone, Jiwani, & Wood, 1991; Cervone & Wood, 1995). Such efficiency usually leads to better solutions and greater achievement. In the face of difficulty, people with higher self-efficacy are more likely to remain *task-diagnostic* and continue to search for solutions to problems. Those with lower self-efficacy, however, are more likely to become *self-diagnostic* and reflect on their inadequacies, which distracts them from their efforts to assess and solve the problem at hand (Bandura & Wood, 1989; Wood & Bandura, 1989).

Recent research indicates that self-regulation is a limited resource that is temporarily depleted when people exercise it, including when they make choices and decisions (Doerr & Baumeister, in press). Making decisions and choices with high confidence (decisiveness) may be less effortful than making choices and decisions with low confidence (indecisiveness). Therefore, people with higher self-efficacy (and greater decisiveness) for decision making may be less vulnerable to postdecision self-regulatory depletion than are people with lower self-efficacy for decision making (and lower decisiveness).

Self-efficacy beliefs influence people's *emotional reactions* to challenges and perceived discrepancies between goals and current performance. During attempts at self-regulation, people gather information or *feedback* about progress toward or away from

a goal. This information can be provided by the physical environment, by other people, or by oneself. Feedback is essential to the effectiveness of goals (Locke & Latham, 1990). However, people do not simply perceive information; they *interpret* it. Likewise, people interpret feedback about progress toward or away from a goal, and different people will interpret and react to the same feedback in different ways. In the face of difficulties, people with weak self-efficacy beliefs easily develop doubts about their ability to accomplish the task at hand, whereas those with strong self-efficacy beliefs continue their efforts to master a task when difficulties arise. A person with relatively strong self-efficacy beliefs is less likely to become anxious or despondent in reaction to self-regulatory challenges and disruptions and in reaction to perceived self-regulatory failure than is a person with weaker self-efficacy beliefs (e.g., Bandura, Cioffi, Taylor, & Brouillard, 1988; Bandura, Pastorelli, Barbaranelli, & Caprara, 1999). Because distress typically disrupts self-regulatory efforts (Scott & Cervone, 2002; Tillema, Cervone, & Scott, 2001), the person with higher self-efficacy is less vulnerable to distress-based disruptions. Self-efficacy beliefs for self-regulation of affect are particularly important in the self-regulation of interpersonal behavior and relationships (e.g., Caprara, 2002; Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003).

These findings are consistent with the broaden-and-build theory of positive emotions (Frederickson, 1998, 2001) that proposes that positive emotions broaden people's thought processes, which can lead to more flexible, creative, and effective problem solving and the enhancement of resources and skills over time. As noted previously, people with stronger self-efficacy beliefs are less likely to become *self-diagnostic* and more likely to become *task-diagnostic* in response to challenges, disruptions, and perceived discrepancies between present and desired states. Self-diagnostic reactions typically lead to distress, which can further disrupt self-regulation.

People who maintain strong self-efficacy beliefs during self-regulatory efforts are less resistant to the disruptions in self-regulation that can result from difficulties and setbacks (e.g., Shiffman et al., 2000) and are more likely to persevere. Perseverance usually increases the likelihood of success, and this success then strengthens the individual's self-efficacy beliefs.

More research is needed to elucidate the relationship between self-efficacy beliefs and self-regulatory perseverance. For example, most studies on the role of self-efficacy beliefs in predicting behavior maintenance have relied on tests of the relation between an initial measure of self-efficacy and a distal behavior. What are needed are studies that involve the repeated assessment of both behavior and self-efficacy beliefs throughout the behavior-change process (Rothman, Baldwin, & Hertel, 2004, p. 141) so that fluctuations in self-efficacy and fluctuations in self-regulatory success can be examined more closely.

To emphasize the role that self-efficacy beliefs play in self-regulation is not to say that strong self-efficacy beliefs are always adaptive. Although most of the research on the effect of self-efficacy on self-regulation suggests that the higher one's self-efficacy, the more effective one's self-regulation in pursuit of a goal, self-efficacy beliefs can be "too high" or "too strong." As Bandura (1986) has suggested, "a reasonably accurate

appraisal of one's capabilities is . . . of considerable value in effective functioning," and people who overestimate their abilities may "undertake activities that are clearly beyond their reach" (p. 393). Effective self-regulation involves choosing the right goals to pursue, and unrealistically strong self-efficacy beliefs may lead one to choose unattainable goals. In addition, an important feature of effective self-regulation is knowing when to disengage from a goal when one's efforts are not paying off (e.g., King & Hicks, 2007). If self-efficacy beliefs are unrealistically high, they may result in the relentless pursuit of obviously (to observers) unattainable goals and overly risky goals (Brandstatter & Renner, 1990; Cervone et al., 2004; Haaga & Stewart, 1992; Janoff-Bulman & Brickman, 1982). This can be especially true later in life when resources (e.g., physical strength and stamina, financial resources) become more scarce (Freund & Baltes, 2002).

Although stronger self-efficacy beliefs usually enhance self-regulatory efforts in a variety of ways, the ways in which these strong self-efficacy beliefs develop can also influence self-regulation. High self-efficacy beliefs that are not supported by past experience or rewarded by positive goal-related feedback can result in wasted effort and resources that might be better directed elsewhere. Strong self-efficacy beliefs that are attained too quickly and easily may lead to complacency and diminished effort and performance. People who develop strong efficacy beliefs without effort and struggle may set lower goals than do those who attain strong efficacy beliefs through hard work. In addition, those who too easily attain strong efficacy beliefs may alter their performance standards and be too easily satisfied by performance feedback, including declining performance (Bandura & Jourden, 1991). As a result, progress toward a goal may be hindered.

## Collective Efficacy and Collective Regulation

Accomplishing important goals in groups, organizations, and societies always has depended on the ability of individuals to identify the abilities of other individuals and to harness these abilities to accomplish common goals. Thus a concept of self-regulation that omits the relationship between an individual and other people has limited utility. Social cognitive theory recognizes that the individual is embedded in a social network and a cultural milieu. Thus self-efficacy theory recognizes that there are limits to what individuals can accomplish alone, no matter how well they can self-regulate. This idea is captured in the notion of *collective efficacy*, "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments (Bandura, 1997, p. 477; also Zaccaro, Blair, Peterson, & Zazanis, 1995). Simply stated, collective efficacy is the extent to which people believe that they can self-regulate effectively *together* to accomplish their shared goals, which we might refer to as *collective regulation*. Just as effective self-regulation requires strong self-efficacy beliefs, effective collective regulation requires strong collective efficacy beliefs.

Collective efficacy, like self-efficacy, influences collective motivation, collective planning and decision making, effective use of group resources, and persistence in goal pursuit (Bandura, 1997; Zaccaro et al., 1995).

Because collective efficacy is a relatively new term, researchers have not reached a consensus on its measurement. Some posit that collective efficacy consists of the individuals' perceptions of the group's abilities (e.g., Weldon & Weingart, 1993) or the individuals' beliefs about the group's beliefs about its abilities (Paskevich, Brawley, Dorsch, & Widmeyer, 1999). Others have added together group members' individual responses to determine collective efficacy (Zacarro et al., 1995). Still others contend that collective efficacy includes beliefs that are shared among group members about how well the individual members can perform the actions necessary for success, as well as beliefs about how well they can orchestrate their combined efforts (Zaccaro et al., 1995). As with all social constructions, a consensus on the definition and measurement of collective efficacy will develop gradually as theorists and researchers debate the merits of the various alternatives (Maddux, 1999b).

Despite a lack of consensus on its measurement (Bandura, 1997; Maddux, 1999b), collective efficacy has been found to be important to a number of "collectives." The more efficacious married couples feel about their shared ability to accomplish important shared goals, the more satisfied they are with their marriages (Kaplan & Maddux, 2002). This same relationship has been found for dating couples (Zapata & Maddux, 2008). Greater individual and collective efficacy of teachers for effective instruction is associated with the greater academic achievement of school children (Bandura, 1993, 1997; Goddard et al., 2004). A strong sense of collective efficacy is associated with the greater effectiveness of self-managing work teams (Little & Madigan, 1997) and group "brainstorming" (Prussia & Kinicki, 1996). In neighborhoods, lower collective efficacy is associated with violent crime rates above and beyond lower family income, higher proportions of minorities, immigrants, and single-parent families, and previous homicide rates (Sampson, Raudenbush, & Earls, 1997). Finally, collective efficacy has become an important construct in the study of team sports and has facilitated a shift in research from a focus on individual motivation to group motivation (George & Feltz, 1995; Marks, 1999). For example, research has found that the collective efficacy of an athletic team can be raised or lowered by false feedback about ability and can subsequently influence its success in competitions (Hodges & Carron, 1992).

As cultural variations become more widely studied, research indicates that collective efficacy may be a more useful predictor of emotion and behavior in some cultures than in others. For example, collective efficacy is negatively correlated with depression, anxiety, and the desire to leave employment for workers in Hong Kong but not for American workers (Schaubroeck, Lam, & Xie, 2000). One explanation for this difference is that collective efficacy may be a more important contributor to group achievements in groups that are higher in collectivism (Gibson, 1999). Nonetheless, individuals will differ in their collectivist and individualist leanings regardless of the group or cultural norms, and these individual differences may be more important than the group or cultural norm (Bandura, 2000).

Researchers also are beginning to understand how people develop a sense of collective efficacy for promoting social and political change (Fernández-Ballesteros, Díez-Nicolás, Caprara, Barbaranelli, & Bandura, 2002)—collective regulation on a large scale. Of course, self-efficacy and collective efficacy go hand-in-hand because a "collection of inveterate self-doubters is not easily forged into a collectively efficacious force" (Bandura, 1997, p. 480). In addition to self-efficacy and collective efficacy, other factors play a role in social change, such as preexisting sociocultural standards, outcome expectations (i.e., perceived benefit or cost of changes to particular groups), and perceived obstacles to change (Bandura, 1997). Collective efficacy beliefs also can be important in people's reactions to traumatic events such as natural disasters (e.g., Benight, 2004).

The ability of businesses, organizations, communities, and governments (local, state, and national) to achieve their goals will increasingly depend on their ability to coordinate their efforts, particularly because their goals often may conflict. In a world in which communication across the globe often is faster than communication across the street, and in which cooperation and collaboration in commerce and government is becoming increasingly common and increasingly crucial, understanding collective efficacy and collective regulation will become increasingly important.

## Summary

Self-efficacy beliefs are beliefs about one's ability to "organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Although self-efficacy was originally conceived not as a personality trait but as a domain-specific belief or set of beliefs, measures of a trait-like general self-efficacy have been developed and have been used frequently in research. In addition, research suggests that the capacity for developing strong self-efficacy beliefs may be influenced by such personality traits as effortful control, conscientiousness, extroversion, and neuroticism. Nonetheless, understanding the role that self-efficacy plays in self-regulation will be facilitated best not by viewing self-efficacy as a trait but by viewing it as a domain-specific belief about one's competencies that interacts in complex ways with the other major components of the *process* of self-regulation. Finally, just as the individual cannot be fully understood without understanding his or her relationships with other people, self-efficacy and self-regulation cannot be fully understood without understanding how the individual works collectively with other people to accomplish personal and shared goals.

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# 15

# *Dealing with High Demands*

## The Role of Action Versus State Orientation

**Nils B. Jostmann and Sander L. Koole**

In their professional, educational, and social lives, people have to face a multitude of demanding commitments. At the workplace, managers often press their subordinates to work fast while maintaining high product standards. Educational environments frequently require students to manage complex working schedules under severe time constraints. People also have to live up to numerous social expectations such as visiting a sick family member, organizing an important neighborhood meeting, or settling a dispute between two friends. Managing such everyday demands is not without costs. Indeed, living up to high demands can drain people's energy, undermine their performance, and leave them sulky and frustrated. In severe cases, high demands may cause stress and even serious health problems (Lazarus & Folkman, 1984; Segerstrom & Miller, 2004). It is therefore important to learn how people can effectively cope with demanding situations (Hockey, 1997; Schönpflug, 1983; Zeidner & Endler, 1996).

In the present chapter, we consider the role of individual differences in *action control* in coping with high demands. Action control refers to the self-regulatory processes that allow people to form, maintain, and implement (or disengage from) their intentions. Building on contemporary theories of action control (Gollwitzer & Bayer, 1999; Kuhl, 2000; Kuhl & Goschke, 1994a), we suggest that efficient action control allows people to cope more effectively with demanding situations. Efficient action control skills may therefore constitute a key moderator of how people cope with demanding situations. Individuals who are more skilled at action control, or *action-oriented* individuals, can be expected to function more optimally under high demands compared to individuals who are less skilled at action control, or *state-oriented* individuals. Indeed, the central theme of the present chapter is that action-oriented individuals shield themselves better than state-oriented individuals against the psychological costs of high demands in cognition, affect, and behavior.

In the following paragraphs, we begin with a general characterization of the construct of action versus state orientation. We then analyze the psychological dynamics of performance under high demands and consider how action versus state orientation may moderate these dynamics. Next, we review existing evidence that is relevant to our analysis. This evidence suggests that, under demanding conditions, action-oriented individuals utilize their working memory capacity more efficiently, regulate their affective states more efficiently, and implement difficult intentions more successfully relative to state-oriented individuals. We go on to present a theoretical model that integrates these findings. Finally, we consider some implications of the present work for how people can better cope with high demands.

## Individual Differences in Action Versus State Orientation

The construct of action versus state orientation was originally developed as part of a broader theory of volitional action control. According to action control theory (Kuhl, 1984, 2000), reactions under high demands depend on whether people are in a *metastatic* (change-promoting), or a *catastatic* (change-preventing) regulatory mode. During the metastatic mode, people utilize their mental capacities efficiently, which is reflected by decisiveness and initiative to pursue intentional action. A metastatic mode is therefore referred to as *action orientation*. During the catastatic mode, however, people make less efficient use of their capacities, which is reflected by indecisiveness and hesitation to change their mental and behavioral states. The catastatic mode is therefore referred to as *state orientation*.

A person may respond in an action- or state-oriented manner depending on the situational context. However, there also exist relatively stable individual differences in action versus state orientation (Kuhl, 1984, 2000; Kuhl & Beckmann, 1994a). Based on this idea, Kuhl (1981, 1994) developed a self-report questionnaire (ACS-90) to assess individual differences in action versus state orientation. The ACS-90 distinguishes between several facets of action versus state orientation. The most relevant facet in the present context is demand-related action orientation (AOD). For convenience, we use the general term action versus state orientation to refer to AOD throughout the present discussion. Each item of the AOD subscale of the ACS-90 represents a demanding situation and an action- versus state-oriented way to cope with the situation. Example items are "When I know I must finish something soon: A. I have to push myself to get started; B. I find it easy to get it done and over with," and "When I am facing a project that has to be done: A. I often spend too long thinking about where I should begin; B. I don't have any problems getting started." In both items, option A reflects the state-oriented way of dealing with the situation, whereas option B reflects the action-oriented alternative. After adding their responses, individuals can be classified as relatively more action-oriented or more state-oriented.

Over the past 25 years, individual differences in action versus state orientation have been extensively investigated by researchers in various countries including Germany, the Netherlands, China, and the USA (for reviews, see Diefendorff, Hall, Lord, & Strean, 2000; Jostmann & Koole, 2009; Kuhl & Beckmann, 1994a). Throughout this research, action versus state orientation has been linked to people's functioning across a broad range of domains including health (Bossong, 1998), work (Diefendorff et al., 2000), sport performance (Heckhausen & Strang, 1988), and education (Diefendorff et al., 1998). The effects of action versus state orientation are independent of the effects of alternative psychological constructs such as achievement motivation (Jostmann & Koole, 2007), self-efficacy (Diefendorff, 2004), or working memory capacity (Jostmann & Koole, 2007). Action versus state orientation correlates weakly with some well-established personality variables such as the Big Five personality dimensions (Diefendorff, 2006). However, the effects of action versus state orientation appear to occur over and above these variables (Diefendorff et al., 2000). An overview of relevant research can be found in Tables 15.1 and 15.2. The main conclusion from this research is that action versus state orientation does not reflect chronic individual differences in motivation, expectancy, or capacity, but rather the ability to utilize one's mental capacities under demanding conditions (Jostmann & Koole, 2006).

Individual differences in action versus state orientation likely originate from individuals' socialization experiences in dealing with demanding situations (Kuhl, 2000). Specifically, individuals who are encouraged by significant others to be decisive and active when they are confronted with obstacles are more likely to develop an action orientation. By contrast, individuals whose environments discourage them from being decisive and active (i.e., overly controlling or neglecting environments) are more likely to develop a state orientation. Action versus state orientation is thus conceived to be a socialized trait (Koole, Kuhl, Jostmann, & Finkenauer, 2006; Kuhl & Keller, 2008)

**Table 15.1** Research Indicating That Action Versus State Orientation (AOD) has Effects Over and Above Alternative Personality Variables

| *Variable* | *Reference* |
|---|---|
| Achievement motivation (Elliot & McGregor, 2001) | Jostmann & Koole (2007) |
| The Big Five (Goldberg, 1992) | Diefendorff et al. (2000) |
| Goal orientation (Dweck, 1986) | Diefendorff (2004) |
| Learned helplessness (Seligman, 1975) | Bossong (1998) |
| Optimism (Scheier & Carver, 1985) | Bossong (1998) |
| Reappraisal & suppression tendencies (Gross & John, 2003) | Koole & Jostmann (2004) |
| Self-efficacy (Bandura, 1991) | Diefendorff (2004) |
| Self-esteem (Rosenberg, 1965) | Koole & Jostmann (2004) |
| Working memory capacity (Turner & Engle, 1989) | Jostmann & Koole (2007) |

*Note*. AOD: Demand-related action vs. state orientation.

**Table 15.2** Correlations Between Action Versus State Orientation (AOD) and Related Personality Variables (*N*s Appear Between Parentheses)

| *Variable* | *Correlations r (N)* | *Reference* |
|---|---|---|
| BAS – Drive (Carver & White, 1994) | .24* (123) | Jostmann (2006) |
| BAS – Fun seeking (Carver & White, 1994) | −.10 (123) | Jostmann (2006) |
| BAS – Reward responsiveness (Carver & White, 1994) | .05 (123) | Jostmann (2006) |
| BIS (Carver & White, 1994) | −.27* (123) | Jostmann (2006) |
| The Big Five (Goldberg, 1992) | | |
| Extraversion | .19* (247) | Diefendorff (2006) |
| Agreeableness | .20* (247) | Diefendorff (2006) |
| Conscientiousness | .46* (247) | Diefendorff (2006) |
| Emotional stability | .38* (247) | Diefendorff (2006) |
| Intellect | .25* (247) | Diefendorff (2006) |
| Mastery – achievement motivation (Elliot & McGregor, 2001) | .14 (52) | Jostmann & Koole (2007) |
| Performance – achievement motivation (Elliot & McGregor, 2001) | −.01 (52) | Jostmann & Koole (2007) |
| RFQ – prevention (Higgins et al., 2001) | .35* (67) | Koole (2005) |
| RFQ – promotion (Higgins et al., 2001) | .42* (67) | Koole (2005) |
| Self-esteem (Rosenberg, 1965) | .53* (82) | Koole & Jostmann (2004) |
| Working memory capacity (Turner & Engle, 1989) | −.14 (52)[1] | Jostmann & Koole (2007) |

*Note.* *$p < .05$, AOD: demand-related action vs. state orientation, BIS: behavioral inhibition system, BAS: behavioral approach system, RFQ: Regulatory Focus Questionnaire.
[1] Correlations were obtained under low demanding conditions.

in contrast to individual differences such as extraversion and neuroticism (Jang, Livesley, & Vernon, 1996), or executive functions (Friedman et al., 2008), which are thought to be largely genetic in origin.

Work on action versus state orientation is grounded in a functional approach to personality (Kuhl, 2000). The functional approach seeks to understand the architecture or functional design of personality processes that occur within individuals. The focus of the functional approach is fundamentally different from factor-analytic approaches to personality, because the latter ignore within-person personality dynamics and emphasize personality differences between individuals (Cervone, 2005). Our goal in the present chapter is to provide a functional analysis of how action- versus state-oriented individuals might think, feel, or behave in response to different levels of situational demand. High demands usually emerge when people attempt to prepare or enact some form of action. In order to understand how action orientation

moderates the psychological dynamics of high demands, we therefore start by outlining some basic principles of human action control.

## The Regulation of Action

To a large extent, human action is based on routines and guided by automatic processes outside the realm of conscious awareness (Bargh, 1994). The automaticity of action extends beyond innate reflexes and overlearned motor programs to complex and meaningful behavior (for a review, see Ferguson & Bargh, 2004). An important conclusion from these findings is that behavioral responses can be automatically triggered by the mere perception of a relevant stimulus. For instance, merely encountering positive or negative stimuli can automatically elicit affective responses (Chartrand, Van Baaren, & Bargh, 2006) or approach and avoidance tendencies (Neumann, Förster, & Strack, 2003).

Automatic processes often allow people to function relatively efficiently and without much conscious effort. However, in some situations, people may need to override automatically activated responses. For instance, after a doctor's visit, a person may adopt the goal to quit smoking. In these or similar cases, people experience a conflict between an automatized (e.g., smoking after dinner) and an intended response (e.g., eating some fruit instead). To resolve this conflict, people need to control their responses and inhibit the automatically activated but situation-inappropriate action tendency (Norman & Shallice, 1986). Exerting control thus reflects a nonautomatic way of responding that increases people's behavioral flexibility when automaticity proves too rigid.

Success at controlling one's responses depends on at least two separate factors (Kane & Engle, 2003). The first factor pertains to the mere capability to resolve the competition between an intended response and an undesired impulse. For ex-smokers, for instance, the critical question is whether they are able to suppress the urge to light a cigarette when they feel the craving for nicotine (Tiffany, 1990). A second, related problem is whether they are able to fully bring their inhibitory capabilities to bear in a given situation (Duncan, 1995). For ex-smokers, the critical question is whether they have really committed themselves to quit smoking and whether this decision becomes sufficiently accessible when the craving arises. To fully utilize their inhibitory capabilities, people thus first need to form and actively maintain an internal representation of how to respond in a critical situation. In other words, people need to form and maintain an *intention*.

Intentions can be seen as arrangements that people make with themselves about what to do in a particular situation. The psychological processes that lead to the formation and implementation of intentions (or to its disengagement) have been subsumed under the term *action control* (Gollwitzer & Bayer, 1999; Kuhl, 1984; Kuhl & Goschke, 1994a). According to action control theories, intentions are mental

representations of action plans that cannot be enacted immediately but have to be postponed until a future moment. By going beyond merely wishing to exert some action, intentions imply that individuals have committed themselves to actually do it ("I really will do it"). After an intention has been formed, it may persist in an implicit format outside of conscious awareness until it automatically becomes reactivated when appropriate situational cues have been encountered (Gollwitzer, 1993; Goschke & Kuhl, 1996). However, when the intended action is complex, difficult, or must not be forgotten, intentions are likely represented in an explicit state that consumes attention (Anderson, 1983; Goschke & Kuhl, 1993).

## Dynamics of Working Memory

The mental system that supports explicit representations of intentions is commonly referred to as *working memory* (Baddeley, 1986; Engle, Kane, & Tuholski, 1999; for differences between intention-related and intention-unrelated functions of working memory, see Kuhl, 2000). The main task of working memory is the online maintenance and manipulation of explicit information in the service of planning, complex reasoning, and intentional action. This task includes storage components and attentional processes.

Due to capacity constraints, working memory can only process a limited amount of information at any given time (Neumann, 1987; Pashler, 1994). To keep an intention cognitively accessible during attempts at control, people therefore need to have sufficient working memory capacity available (Kane & Engle, 2003). One important way in which working memory maintains sufficient capacity is to frequently *update* its contents such that irrelevant information vanishes, relevant information maintains in working memory, and new information that may be potentially relevant gains access to it.

Contemporary models of working memory suggest that it updates its contents by facilitating the neurocognitive pathway between working memory and lower order behavioral output systems (see Figure 15.1). When this pathway is facilitated, intentions stored in working memory are capable of determining behavioral output. At the same time, perceptual input can enter working memory and change its contents. When the pathway is blocked, however, the information exchange between working memory and lower order systems ceases. When this case occurs, people's behavior is likely to be determined by automatic behavior routines. Moreover, pathway blocking also prevents perceptual information from updating the contents of working memory with new and potentially more relevant information (Braver & Cohen, 2000; Kuhl, 2000; Kuhl & Kazén, 1999).

Updating may be achieved when people deliberately revise and replace activated information in working memory (Miyake, Friedman, Emerson, Witzki, & Howerter, 2000). Such a strategy is mentally costly because it requires high effort investment

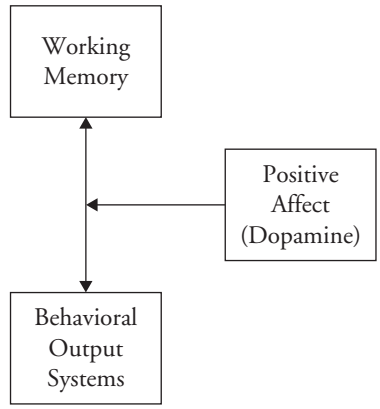


**Figure 15.1.** A model of action control and working memory updating (adapted from Braver & Cohen, 2000; Kuhl, 2000).

(Schmeichel, 2007). A more efficient updating strategy may therefore be one that does not rely on deliberate effort investment but on the availability of positive affect (Gray et al., 2005). In line with this notion, action control theories suggest that high positive affect facilitates the pathway between working memory and behavioral output systems, whereas low positive affect leads to its inhibition (for experimental evidence, see Kuhl & Kazén, 1999).

The cognitive effects of positive affect are assumed to be mediated by increased levels of dopaminergic activity in relevant brain areas (e.g., anterior cingulate cortex, prefrontal cortex; see Ashby, Isen, & Turken, 1999). Consistent with the predictions of action control theories regarding the role of positive affect, recent neuropsychological models (Braver & Cohen, 2000) suggest that increased dopaminergic activity in relevant brain regions facilitates the updating of working memory. Moreover, the experimental induction of high positive affect and a genetic disposition for high dopaminergic activity both facilitate intention implementation in a control task on the one hand, and the uptake of new information in working memory on the other hand (Dreisbach et al. 2005; Dreisbach & Goschke, 2004). Taken together, high positive affect, or high dopaminergic activity, facilitates the updating of working memory.

People may not always be able to fully utilize their working memory capacity in a given situation (Ashcraft & Kirk, 2001; Schmader & Johns, 2003). More specifically, sustained use of working memory can make people less able to utilize their working memory capacity. For instance, deliberate attempts at controlling one's thoughts have been found to cause performance decrements in subsequent reasoning and comprehension tasks (e.g., Muraven & Baumeister, 2000; Schmeichel, Vohs, & Baumeister, 2003). Furthermore, sustained activation of intentions in working memory (Cohen, Dixon, & Lindsay, 2005) or continuous exertion of control (Van der Linden, Frese, & Meijman, 2003) both lead to working memory impairments. These findings indicate that sustained use of working memory can reduce its effectiveness. In the

present chapter, we refer to conditions of sustained working memory use as *high demands*. By contrast, conditions in which sustained working memory use is absent we refer to as *low demands*.

High demands may decrease the effectiveness of working memory in a wide range of everyday life situations that are characterized by, for instance, the activation of multiple conflicting goals (Kuhl & Helle, 1986), demanding relationships (Baldwin, Carrell, & Lopez, 1990), pending assignments (Higgins, 1987), performance pressure (Beilock, Kulp, Holt, & Carr, 2004), or compelling time constraints (De Dreu, 2003). In these and related situations, working memory remains activated for some time. In line with this reasoning, high demands have been found to impair subsequent performance on tasks that require high effectiveness of working memory but not on tasks that can be performed on an automatic or routine level (Beilock et al., 2004).

A possible reason why high demands can reduce the effectiveness of working memory is that high demands temporarily impair the updating function of working memory. Sustained activation of working memory may lead to declines in dopaminergic activity. In line with this idea, recent research suggests that cognitive impairments after prolonged engagement in a control task are caused by decreases in dopaminergic activity (Lorist, Boksem, & Ridderinkhof, 2005). To the extent that working memory updating is involved in control (Kane & Engle, 2003), the findings of this research thus support the idea that high demands impair the updating function of working memory.

## Shielding Against Demands: The Role of Action Versus State Orientation

The foregoing discussion suggests that high demands emerge when working memory loses its effectiveness during sustained use. Because working memory effectiveness is a key element of control processes (Kane & Engle, 2003), high action control skills may facilitate coping with high demands. Indeed, a fundamental assumption of action control theories is that people are often able to mobilize cognitive, affective, and attentional control processes to counterregulate the effects of perceived hindrances on intended actions (Gollwitzer, 1993; Kuhl, 1984; see also Rothermund, Voss, & Wentura, 2008). In the present context, we refer to these processes as *shielding* (Shah, Friedman, & Kruglanski, 2002). Because high demands can be an important hindrance during goal pursuit, they may lead people to shield their intentions more intensively.

High demands may not invariably promote shielding. According to action control theories (Kuhl, 1984, 2000), action versus state orientation is an important moderator of how people respond to high demands. Specifically, high demands may trigger action-oriented individuals to utilize their psychological resources more efficiently in order to better exert action control. By contrast, high demands may not have similar effects among state-oriented individuals. Specifically, state-oriented individuals may fail to utilize their psychological resources more efficiently, and consequently may not

be able to better exert action control under high demands. The effects of high demands on action control among action- versus state-oriented individuals are likely reflected on various dimensions of action control including cognition, affect, and behavioral outcome. Based on these assumptions, we suggest that action-oriented compared to state-oriented individuals are better able to cope efficiently with the cognitive, affective, and behavioral consequences of high demands.

Various lines of research support the idea that action-oriented individuals cope more efficiently with high demands than state-oriented individuals. A first line of research suggests that action-oriented compared to state-oriented individuals are more skilled at *cognitive shielding* as reflected by efficient use of cognitive resources under high demands. In particular, action-oriented individuals report fewer intrusive thoughts (Kuhl & Fuhrmann, 1998) and fewer everyday lapses of attention (Kuhl & Goschke, 1994b) than state-oriented individuals. Action-oriented individuals have also been found to use more efficient and parsimonious decision-making strategies under time pressure than state-oriented individuals (Stiensmeier-Pelster, John, Stulik, & Schürmann, 1989). Finally, action-oriented compared to state-oriented individuals performed better in a planning task after they had extensively deliberated an unsolved personal problem (Jostmann & Gieselmann, 2008).

The aforementioned findings suggest that action-oriented individuals make better use of their working memory capacity under high demands than state-oriented individuals. An investigation by Jostmann and Koole (2006) tested this assumption more directly. Participants first visualized either a demanding or an accepting person from their personal lives, after which they performed an operation span (OSPAN) task (Turner & Engle, 1989). The OSPAN task requires participants to calculate simple arithmetic equations while retaining words in memory for recall. Working memory capacity is reflected by participants' span, that is, the number of words that participants can recall correctly while performing the calculations. After visualizing a demanding person, action-oriented compared to state-oriented individuals displayed higher spans. Notably, no similar differences were found among participants who visualized an accepting person. These findings indicate that action-oriented individuals do not have generally greater working memory capacity but they can better shield their working memory capacity against high demands.

A second line of research suggests that action-oriented individuals are more skilled at *affective shielding,* as reflected by the ability to maintain or restore a positive affective state under high demands. In principle, it may be adaptive to be able to down-regulate both positive and negative affect. Since high demands constitute an aversive state, however, affective shielding pertains to the down-regulation of negative affect (and the up-regulation of positive affect) rather than the down-regulation of positive affect. One indicator of affective shielding is that, under high demands, action-oriented individuals maintain better access to their emotional preferences (Baumann & Kuhl, 2005) and a more positive and autonomous self-image (Koole, 2004) compared to state-oriented individuals. Moreover, action- compared to state-oriented individuals report higher well-being (Baumann, Kaschel, & Kuhl, 2005) and less depression

(Bossong, 1998) during stressful periods of their personal lives. Among college students, having an action orientation is correlated with increments in positive affect and energy over the course of a semester (Brunstein, 2001).

According to Koole and Jostmann (2004), affective shielding among action-oriented individuals takes place on an intuitive level that does not rely on deliberate or conscious control. In line with this idea, Koole and Jostmann found that action-oriented compared to state-oriented individuals under high demands were faster to provide positive responses to negative target words in a task that measured intuitive affective shielding (i.e., an affective Simon task; De Houwer & Eelen, 1998). Moreover, action-oriented compared to state-oriented individuals under high demands were faster to detect happy faces in crowds of angry faces in a face-discrimination task (Öhman, Lundqvist, & Esteves, 2001). Importantly, action-oriented individuals were not faster to give negative responses to positive words, or to detect angry faces in crowds of happy faces, respectively. Accordingly, high demands led action-oriented individuals to shield specifically against negative affect rather than simply increasing overall task speed.

More evidence for intuitive affective shielding was found by Jostmann, Koole, Van der Wulp, and Fockenberg (2005), who subliminally primed action- versus state-oriented participants with schematic drawings of either happy, neutral, or angry faces. Subsequent to the subliminal priming, all participants rated the pleasantness of nonfamiliar syllables to obtain an implicit index of their current mood (Tesser, Millar, & Moore, 1988). Similar to typical findings of subliminal affective priming research (e.g., Chartrand et al., 2006), state-oriented participants indicated better mood when they were primed with happy faces compared to neutral faces or angry faces. Among action-oriented individuals, however, the pattern was nonsignificantly reversed such that angry faces led to higher mood ratings than neutral or happy faces. Importantly, among participants who were primed with angry faces, those with an action orientation reported better mood than did those with a state orientation. These findings suggest that action orientation protects against negative affect even when it is triggered outside of conscious awareness.

## Behavioral Shielding Revisited

Ultimately, the most important task of volitional action control is *behavioral shielding*, which consists of the enactment of one's intentions under high demands. A third and final line of research has examined whether action-oriented compared to state-oriented individuals are better at behavioral shielding. Various field studies have found action-oriented individuals are more successful than state-oriented individuals in maintaining a healthy diet (Palfai, 2002; Fuhrmann & Kuhl, 1998), avoiding negative behavior related to alcohol abuse (Palfai, McNally, & Roy, 2002), and enacting health- and study-related intentions (Beswick & Mann, 1994; Bossong, 1998; Kendzierski, 1990). Furthermore, experimental research indicates that action-oriented

compared to state-oriented individuals have fewer difficulties in initiating new courses of action (Kuhl & Beckmann, 1994b; Dibbelt, 1997). These reported benefits may explain why action-oriented individuals receive better supervisor ratings (Diefendorff et al., 2000; Diefendorff, Richard, & Gosserand, 2006), more academic success (Bossong, 1998; Diefendorff et al., 1998), and superior athletic performance under pressure (Heckhausen & Strang, 1988).

Though suggestive, the aforementioned research suffers from some important limitations. First, previous research has not systematically measured or manipulated the level of demand. It remains therefore unclear whether the reported effects are due to higher coping efficiency or, alternatively, to generally higher levels of response suppression among action-oriented individuals. From the present perspective, however, action-oriented compared to state-oriented individuals should only be better at suppressing undesired intentions when demands are high. Indeed, under low demands, state-oriented individuals may function equally well or even better than action-oriented individuals (Koole, Kuhl, Jostmann, & Vohs, 2005). Second, previous research has largely relied on field studies that lack the control provided by strictly experimental settings. As a result, much remains unknown about the precise mechanisms through which action orientation facilitates behavioral shielding during high demands. Third and last, previous research has often failed to use validated measures of behavioral performance. Consequently, the interpretation of many reported findings remains ambiguous.

To extend previous research on behavioral shielding, Jostmann and Koole (2007) conducted a series of studies on the Stroop color naming task (Stroop, 1935; for a review, see MacLeod, 1991), which is a well-established measure of how well people can control their responses (Miyake et al., 2000). The Stroop task requires participants to indicate the ink color in which a word is displayed and ignore any meaning of the word, which can refer to a color too. As indicated by increased numbers of errors and slower response latencies, people perform generally worse when the ink color is incongruent with the color meaning (e.g., *RED* displayed in blue) compared to when the word is a meaningless letter string (e.g., *XXXX* displayed in blue). The amount of such "Stroop interference" can be regarded as a negative index of how well people are able to shield their behavior.

In a first study, Jostmann and Koole (2007) asked action- versus state-oriented participants to perform an OSPAN task in order to induce a context of high demands. In a subsequent Stroop task, action-oriented participants displayed less Stroop interference than state-oriented participants. In a second study, participants performed one lengthy Stroop task. The idea was that performance was more demanding during later phases compared to early phases of the task because continuous performance would increase the working memory load of the task (Lorist et al., 2005). In line with expectations, action-oriented compared to state-oriented participants displayed less Stroop interference only during later phases. Accordingly, action-oriented compared to state-oriented individuals do not generally perform better at the Stroop task but only when the situational context is demanding.

In a third and final study, Jostmann and Koole (2007) examined the role of working memory in action-oriented individuals' behavioral shielding under high demands. Previous research has established that Stroop performance draws more heavily on working memory capacity when the tasks contains high numbers of congruent Stroop trials (e.g., *BLUE* displayed in blue) compared to high numbers of incongruent Stroop trials, because high numbers of congruent trials tempt people to neglect the task intention of naming the ink color and read the meaning instead (Kane & Engle, 2003). In line with this notion, Jostmann and Koole found that Stroop interference was greater in conditions with many congruent trails compared to conditions with many incongruent trials. More important, however, when high demands were induced, action-oriented individuals displayed less Stroop interference in conditions with high numbers of congruent trials than state-oriented individuals. When no demands were induced, however, action- and state-oriented participants performed equally well. Taken together, improved behavioral shielding among action-oriented compared to state-oriented individuals under high demands emerges especially when behavioral shielding relies on working memory capacity.

## An Updating Model of Volitional Action Control

Thus far it has become apparent that action versus state orientation regulates the psychological impact of demands across three major domains of human functioning: cognition, affect, and behavior. This broad influence of a single variable might be considered surprising, because many psychologists today focus increasingly on processes and phenomena that are specific to particular paradigms and experimental tasks. How can a single variable like action versus state orientation predict such broad aspects of human functioning?

Our explanation for the generality of the effects of action versus state orientation is that cognitive, affective, and behavioral shielding all contribute to intentional action control. Cognitive shielding facilitates the formation and maintenance of intentions in working memory. Affective shielding processes block negative mood and the activation of intention-inappropriate action tendencies. Behavioral shielding facilitates the implementation of intentions by overriding competing impulses. Because action control can only be effective to the extent that all subcomponents function effectively, improved shielding in one domain may also lead to improved shielding in other domains. In the following, we will further elaborate on this idea by proposing an integrative model of action control and coping with high demands. This model is an extension of Kuhl and Kazén's (1999) model of action control.

The present model is based on the idea that effective action control depends on the interaction between high-level mental systems like working memory and low-level behavioral output systems. As outlined above, information between these two types of systems can be exchanged when the connecting neurocognitive pathway is

facilitated. Consequently, intentions that are represented in working memory can be released to make them accessible for implementation. More important in the present context, pathway facilitation also allows perceptual information to enter working memory, thereby updating its contents. Pathway facilitation is further mediated by positive affect (or dopamine) such that high levels of positive affect (or dopaminergic activity) facilitate the pathway, whereas low levels of positive affect (or dopaminergic activity) lead to its inhibition (Braver & Cohen, 2000; Dreisbach et al., 2005; Kuhl, 2000).

Based on the foregoing analysis, we suggest that action control is successful to the extent that working memory can regularly update its content. Under high demands, the updating function likely becomes temporarily impaired. The reason is that high demands involve the sustained activation of working memory, which, in turn, leads to declines in dopaminergic activity (Lorist et al., 2005). Consequently, effective coping with high demands relies on the ability to maintain the updating function of working memory. Deliberate and effortful attempts at updating working memory are likely to fail under high demands (Schmeichel, 2007). A more efficient way to maintain the updating function is to restore sufficient levels of positive affect (or dopaminergic activity) under high demands.

The updating model suggests that action-oriented individuals cope more effectively with high demands because they maintain the updating function more efficiently than state-oriented individuals. Although the ultimate validity of the model remains to be tested by future research, existing evidence is consistent with its assumptions. For instance, Jostmann and Koole (2006) found that action-oriented but not state-oriented individuals utilize their working memory capacity more efficiently under high compared to low demands. Moreover, action-oriented compared to state-oriented individuals have also been found to be better able to regulate their affective states (Koole & Jostmann, 2004), even when these states were triggered unconsciously (Jostmann et al., 2005). Finally, recent research revealed that improved intention implementation under high demands among action-oriented individuals only occurred when control relied on working memory (Jostmann & Koole, 2007). These findings suggest that action-oriented compared to state-oriented individuals can better update working memory under high demands.

## Practical Implications

The present analysis of action versus state orientation stimulates the development of practical strategies for more effective coping with high demands. One major conclusion of the present analysis is that individuals vary widely in their ability to cope with demands. Consequently, the same intervention that may help one group of individuals is likely to undermine the performance of another group of individuals. Thus the present analysis strongly implies that individual differences in specific coping abilities should be taken seriously. Imposing a uniform task structure upon both action- and

state-oriented individuals may well result in suboptimal performance for either group of individuals. The most optimal interventions will tailor task settings to the specific characteristics of the individuals.

State-oriented individuals warrant special attention when it comes to coping with demands. Experimental research has revealed repeatedly state-oriented individuals' inability to utilize their mental capacities efficiently under high demands (e.g., Jostmann & Koole, 2007; Koole & Jostmann, 2004). These findings converge with field studies showing that state-oriented individuals' inability to utilize their mental capacities efficiently under high demands may lead to performance impairments in many everyday achievement settings such as at work or during study (Bossong, 1998; Diefendorff et al., 2000). The question therefore arises as to how state-oriented individuals can be helped to meet their goals more effectively.

One radical strategy may be to try to eliminate demands altogether from the lives of state-oriented individuals. This strategy seems difficult to realize, because demands are an integral aspect of life. However, even more moderate strategies that seek to reduce demands as much as possible should be applied with caution. Some prior research suggests that self-regulatory resources such as action orientation are much like a skill that can be learned and trained (Schulte, Hartung, & Wilke, 1997). Thus, although reducing demands is likely to provide temporary relief to state-oriented individuals, it may at the same time deprive these individuals of the opportunity to increase their coping skills to deal with demanding situations in other contexts. Consequently, the strategy of reducing or eliminating demands altogether may ultimately backfire for state-oriented individuals.

Another strategy may be to reduce the working memory load of state-oriented individuals. Control abilities among state-oriented individuals may remain unaffected under high demands when task intention is externally prompted (Jostmann & Koole, 2007). Thus external prompts may help state-oriented students or employees to free up their working memory resources and thus to maintain their behavioral efficiency under high demands. In more unstructured and unpredictable situations, however, it could be useful to teach state-oriented individuals strategies to generate their own idiosyncratic prompts and to form implementation intentions or action plans (Gollwitzer & Bayer, 1999).

A final set of questions relates to whether and how state-oriented individuals might be stimulated to become more action-oriented. According to action control theory (Kuhl, 2000; see also Koole et al., 2006), action versus state orientation is not biologically determined but rather develops from experiences with demanding situations. As such, it is theoretically possible for persons to change from reacting in a predominantly state-oriented mode in demanding situations towards a more action-oriented mode of responding (Schulte et al., 1997). One way to make people more action-oriented may be to gradually expose them to progressively higher levels of demands in order to inoculate them against higher levels of demands (Bossong, 1998; Meichenbaum & Deffenbacher, 1988). An effective way to implement such training may be to focus on specific critical life domains such as work, education, or social

relations, rather than trying to improve someone's overall action orientation across situations. By building action orientation in one domain, individuals may gradually learn to transfer their orientation to other domains.

It is important to recognize, however, that high individual performance under high demands is especially valued in modern Western society. There exist other societies, for instance, who place greater value on virtues such as self-sacrifice or collective rather than individual performance (Markus & Kitayama, 1991). As such, having a state orientation may become more problematic the more a society or culture values high effectiveness under high demand. The adaptiveness of state orientation may indeed be considered from an interpersonal or group level. Specifically, it is possible that state-oriented individuals' hesitation is adaptive on a group level as, for instance, when it prevents the premature implementation of erroneous group decisions (for initial evidence, see Haschke & Kuhl, 1995). Practitioners are thus advised to take a broad perspective on the utility of action versus state orientation, and consider potential trade-offs between the interests of the individual and the interests of the broader social system within which the individual functions (Kuhl & Keller, 2008).

## Concluding Remarks

In modern society, dealing with high demands is increasingly necessary for managing one's professional, educational, and social lives. In the present chapter, we have shown that coping effectiveness is intimately linked to intentional action control. Under high demands, high action control skills help people to function more effectively on three major levels of psychological functioning: cognition, affect, and behavior. Action versus state orientation may thus represent a key factor in understanding who gets going when the going gets tough.

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# 16

# *The Cybernetic Process Model of Self-Control*

## Situation- and Person-Specific Considerations

**Eran Magen and James J. Gross***

Eddie is hungry. Standing in line at the cafeteria, he tries to decide between the roasted eggplant sandwich and the triple-cheese pizza. Eddie faces this choice daily. Ever since the school cafeteria added the fast food stand, students have been able to make their own decisions about the content of their lunches. Eddie has been making decisions for a while, and has recently started gaining weight at an alarming rate. His parents have talked with him about making responsible food choices, and he himself has noticed that he has less energy to play and to study. Standing in line, Eddie is torn between his wish to improve his situation, and his desire to eat the warm, rich, luxurious pizza. He knows it would be best to pick the healthy but boring sandwich, but the pizza is just so inviting, and the sandwich will always be there tomorrow, right?

Throughout the world, millions of people face dilemmas similar to the one that Eddie faces every day. Many of them know what would be the best thing to do, but still find themselves wanting to do just the opposite. Dilemmas of this nature are not limited to food choices. They span decisions involving sleep, exercise, sex, drug use, work, relationships, retirement savings, and more. We can define temptation in a general way as *the impulse to behave in a way that one fully expects to regret at a later time* (Magen & Gross, 2007). Although people frequently behave in ways that they know they *may* regret, our focus is on behaviors that people *fully* expect to regret, even before they perform them. Note that this definition does not include an element of probability ("maybe I'll regret it, and maybe I won't"); instead, one is certain that acting in accordance with the desired behavior will lead to regret. More specifically, people experience temptations when the goal of experiencing a relatively small short-term

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**Table 16.1** Examples of Temptations and Nontemptations

| *Short-term goal* | *Long-term goal* | *Self-control task* |
|---|---|---|
| *Temptations (conflict between short-term and long-term goals)* | | |
| Eating pizza | Eating healthily | Inhibiting pizza consumption |
| Not "rocking the boat" | Eradicating workplace racism | Initiating assertive objection |
| *Nontemptations (no conflict between short-term and long-term goals)* | | |
| Eating pizza | Enjoying lunch | N/A |
| Not "rocking the boat" | Maintaining good relations with the boss | N/A |

*Note.* In tempting situations, the person realizes that acting in line with the short-term goal will result in failure to attain the long-term goal, and consequently lead to regret.

gain is competing with the goal of experiencing a relatively large long-term gain (see Table 16.1). For example, the short-term goal of enjoying the taste of pizza may compete with the long-term goal of eating more healthily. Generally speaking, despite having a clear long-term goal in mind, one may feel drawn to act in a way that prevents the attainment of this goal, in order to experience a relatively small but more immediate short-term gain.

Dilemmas such as these require self-control in order to overcome the temptation to act in a way that would provide short-term pleasure and long-term suffering. We will use the term "self-control" to denote *the ability to resist temptations*. Self-control may be achieved through deliberate, conscious acts, or through nonconscious acts. Our main focus in this chapter revolves around ways in which people consciously apply self-control, having realized that they are facing a temptation and decided to volitionally resist it. Our focus notwithstanding, we find it important to note that a growing body of research has been exploring ways in which behavioral goals can be activated nonconsciously (e.g., Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001; Bonson et al., 2002; Fishbach, Friedman, & Kruglanski, 2003; Förster, 2007; Kavanagh, Andrade, & May, 2004; Lowe & Levine, 2005; Mauss, Cook, & Gross, 2007; Wansink, Painter, & Lee, 2006).

The specific technique or method that people employ to achieve self-control can change from one temptation to the next. Referring to the examples we listed in Table 16.1, one might need to inhibit a certain impulse (e.g., avoid ordering pizza despite the urge to do so) or to initiate a behavior despite the impulse to avoid doing so (e.g., voicing disagreement despite the urge to stay quiet). Self-control refers to acting in line with one's long-term goal, despite the allure of a contradictory short-term goal.

Research has outlined a multitude of techniques for self-control, resulting in an overwhelming array of solutions to specific problems, but without an overarching

framework that would enable researchers and practitioners to classify the various techniques into related groups. Furthermore, specific techniques of self-control are described and studied without consideration to the specific situation in which the temptation arises, or to the traits and personalities of specific individuals, and are thus rarely custom-tailored to the person who will need to apply them in a given situation. What could Eddie do to eat more healthily when he is standing in line at the cafeteria? What about recess, when a well-meaning friend offers him a calorie-rich (but nutrition-poor) treat? What would we advise Eddie to do if he were a 2nd grader? Would that be different if he were a 10th grader? Would we give different advice to Eddie's father, with respect to his own similar dilemmas at work?

Our goal in this chapter is twofold. First, we present an integrative framework that will enable researchers and practitioners to use a shared language when communicating their insights and findings. To this end, we present a model of self-control, which we call the cybernetic process model of self-control. Second, we propose situation- and person-specific considerations when developing and choosing specific techniques for self-control. This, in turn, will allow practitioners and researchers to systematically examine the etiology of the difficulty that their client (or research participant) is facing, determine the points that are most amenable to intervention, and then select or develop the interventions that would be most appropriate, given the particular person and the particular situation.

## The Cybernetic Process Model of Self-Control

The cybernetic process model of self-control (see Figure 16.1) represents a synthesis of two earlier models: the cybernetic control model (Carver & Scheier, 1982) and the process model of emotion regulation (Gross, 1998; Gross & Thompson, 2007). The cybernetic control model provides a broad conceptual framework that describes ways in which people (and other systems) manipulate their environment in order to achieve desired end states. However, it does not explicitly address the problem at the heart of self-control challenges: the need to override prepotent responses that may undermine important long-term goals. The process model of emotion regulation was developed to organize the literature on the self-regulation of a particular type of prepotent response (i.e., emotions), and to delineate discrete methods that people employ to this end. Combining the two models allowed us to integrate the broad applicability of the cybernetic control model with the explicit focus on self-regulatory processes of the emotion-regulation process model. The resulting cybernetic process model of self-control can be applied to describe and analyze self-control behaviors (both successes and failures) in a wide array of domains.[1]

At the heart of the cybernetic process model of self-control is the notion that behavior is motivated by the difference between how things are (one's perceived environment) and how one would like things to be (one's goals). The impulse to behave in

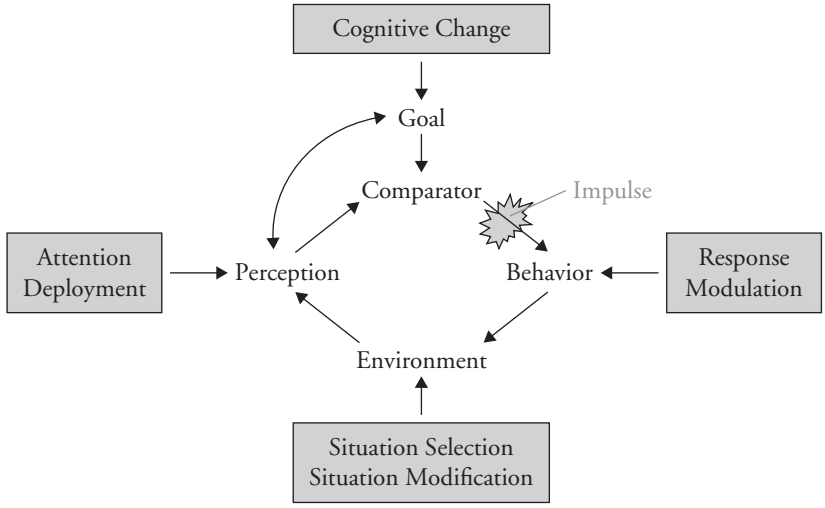


**Figure 16.1.** The cybernetic process model of self-control, based on cybernetic control theory (inner circle: Carver & Scheier, 1982) and the process model of emotion regulation (outer circle, gray boxes: Gross, 1998; Gross & Thompson, 2007).

a certain way represents an attempt to change the way things are, so that they would become more similar to the way one would like things to be. Each stage of the process receives input from the preceding stage, processes it in some way, and feeds an output to the subsequent stage of the process. Thus the environment is perceived, and this impression of the environment is fed to the comparator. The comparator compares the perceived environment to a goal (or standard), and outputs an impulse, aimed at generating behavior that would influence the environment, so that it would more closely match the goal on the next comparison. This impulse influences behavior, which in turn impacts the environment. The acted-upon environment is perceived again, compared again with the goal, the comparator outputs another impulse, and so on.

The cybernetic process model of self-control allows us to describe in detail the process by which impulses arise, as well as ways in which impulses can be self-regulated. The process by which the individual perceives the world, compares it with a goal, and acts upon it in a goal-oriented manner provides the inner circle of the model (see Figure 16.1). As we describe in greater detail below, the cybernetic process model of self-control proposes that control of behavior may be achieved by applying one of the following methods, or any combination of them: (a) situation selection, (b) situation modification (c) attention deployment, (d) cognitive change, or (e) response modulation (see Table 16.2). Many effective responses to temptations involve using more than one type of method. A common example is engaging in an alternative activity in order to distract oneself (e.g. Feindler, Marriott, & Iwata, 1984; Patterson & Mischel, 1976), which combines elements of both attention deployment and response

**Table 16.2** Examples of Existing Self-Control Techniques and Their Corresponding Stages and Intervention Types in the Cybernetic Process Model of Self-Control

| *Cybernetic stage* | *Intervention type* | *Specific techniques* |
|---|---|---|
| Environment | Situation selection | Breaking ties with drug-using associates[1]<br>Reduce stress through mindful scheduling[2] |
| | Situation modification | Hiding tempting object[3]<br>Chemical pleasure blockers[4]<br>Community reinforcement[5]<br>Precommitment[6] |
| Perception | Attention deployment | Engaging in alternative activity[7]<br>Goal verbalization[8]<br>Cognitive load + self-control cues[9]<br>Relaxation, e.g. deep breathing, imagery[10] |
| Goal/Comparator | Cognitive change | Cognitive reconstrual[11]<br>Modifying internal dialog[12]<br>Soft commitment[13]<br>Acceptance and defusion[14] |
| Behavior | Response modulation | Behavioral suppression[15]<br>Engaging in alternative activity[7]<br>Relaxation, e.g. deep breathing, imagery[10] |

*Note*. 1 Schroeder et al., 2001; 2 Fristad, Gavazzi, & Soldano, 1998; 3 Metcalfe & Mischel, 1999; Wansink, Painter, & Lee, 2006; 4 Drugs meant to reduce pleasure from alcohol consumption (e.g. Acamprosate/Disulfiram/Naltrexone); Luty, 2006; 5 Sisson & Azrin, 1986; 6 Ariely & Wertenbroch, 2002; 7 Kavanagh, Andrade, & May, 2004; Patterson & Mischel, 1976; 8 Genshaft, 1983; Patterson & Mischel, 1976; 9 Mann & Ward, 2004; Parent, Ward, & Mann, 2007; Westling, Mann, & Ward, 2006; 10 Feindler, Marriott, & Iwata, 1984; Mann & Ward, 2004; 11 Fujita, Trope, Liberman, & Levin-Sagi, 2006; Magen & Gross, 2007; W. Mischel & Moore, 1980; 12 Stern, 1999; 13 Kirby & Guastello, 2001; Khan & Dhar, 2007; 14 Forman et al., 2007; Gifford et al., 2004; Kavanagh et al., 2004; 15 Baumeister, Muraven, & Tice, 2000; Feindler et al., 1984; Muraven & Baumeister, 2000.

modulation. Successful application of any of these interventions will result in behavior that is better aligned with long-term goals (e.g., choosing a healthy lunch), despite competing short-term goals (e.g., eating pizza).

In the remainder of this section, we elaborate on each of the five families of self-control techniques, as delineated by the cybernetic process model of self-control. We explain the general principle behind each method, and provide examples to illustrate when and how each may be used, based on examples from the research literature (see Table 16.2). Although these general techniques can be applied with respect to any self-control challenge, we will demonstrate how each method can be applied in a specific

case, in order to provide a concrete example. To this end, we will consider a person who is sorely tempted to shoplift, but is trying to overcome this powerful urge. For each of the techniques in our model, we will provide a concrete example, followed by a brief overview of research findings related to that technique of self-control.

### *Situation Selection*

*Situation selection* is the most forward-looking approach to self-control. This family of self-control techniques includes any attempts to choose situations or environments that make it less likely for temptation to arise. In terms of the cybernetic control model, this technique operates on the *environment* element of the loop.

> Robyn has managed to avoid shoplifting for almost a week. She is running low on groceries, and realizes that she needs to replenish her stock. However, the supermarket has always presented her with endless opportunities to steal various products, and she is concerned that she may not be able to resist the temptation of shoplifting if she goes. Robyn decides to order her groceries online and have them delivered to her house. By doing this, Robyn would not have to confront the powerful temptation to shoplift.

In this example, Robyn chose an environment that would not threaten her goal of avoiding shoplifting. In terms of the cybernetic process, if Robyn spends time near certain stimuli (*environment*), she is likely to notice them (*perception*). This may generate a temptation to steal (a *goal*), which may lead to shoplifting (*behavior*). Conversely, if Robyn avoids such stimuli, she is less likely to perceive them, temptations are less likely to be activated, and shoplifting is less likely to be initiated.

In social psychology, classic research demonstrates the powerful effects of channel factors (Leventhal, Singer, & Jones, 1965), and how the accessibility of environmental facilitators and hindrances impacts behavior. More recently, researchers studying addiction have presented overwhelming evidence that points to the power of environmental stimuli to generate drug craving, if these stimuli were previously associated with drug consumption (Bonson et al., 2002; Weiss, 2005). In Robyn's case, choosing to stay out of the supermarket will make her more less to perceive the easy-to-steal products, shoplifting goals would be less likely to become activated, and she would be less likely to steal, thereby realizing her long-term goal of not shoplifting. For other examples of situation selection techniques, see Table 16.2.

### *Situation Modification*

Even if a problematic situation cannot be entirely avoided, key elements of the environment may still be subject to deliberate beneficial change. *Situation modification*

refers to the family of self-control techniques by which people strategically change the environment in order to alter the impulses and subsequent behaviors that will result from it. Situation modification and situation selection are not easily separable, since modifying a situation beyond a certain extent can be said to produce a new situation, and we will occasionally refer to the two sets of techniques as "situation selection/modification." In terms of the cybernetic control model, situation modification operates on the *situation* element of the loop.

> Robyn, who has recently decided to stop shoplifting, is driving with a friend to a potluck dinner party. Shortly before arriving at the host's house, Robyn realizes that she forgot to bring the dish that she prepared. She decides to stop at a local grocery store and pick up some ice cream. As she pulls into the parking lot, Robyn becomes worried that she may be caught by the urge to shoplift once she is inside. She prefers not to avoid the store altogether (doing that would qualify as an application of the situation selection technique, and would also leave her empty-handed at the potluck). Instead, Robyn asks her friend to accompany her into the store, briefly explaining that she sometimes experiences a strong urge to shoplift, and that having somebody to watch her would be of great help.

In this example, Robyn altered the situation she was in, in order to prevent the elicitation of undesirable impulses, or facilitate the elicitation of desirable impulses. In this way, even without avoiding the situation or choosing a new environment, Robyn successfully negotiated a temptation she wished to resist. Even small changes to tempting situations, such as placing candy bowls a short distance away from an easy-to-reach location (Wansink, Painter, & Lee, 2006) or hiding treats behind a screen (W. Mischel & Ebbesen, 1970) can significantly impact the pull that these temptations hold over children as well as adults. For other examples of situation modification techniques, see Table 16.2.

### *Attention Deployment*

Even without changing the external situation, it is possible to selectively attend to certain aspects of the situation, in order to alter the flow of information processing and subsequent reactions to this information. Situations have many aspects, and *attention deployment* refers to the family of techniques by which individuals direct their attention within a given situation in order to influence their reactions to it. This method of self-control can be thought of as an internal version of situation selection, as it changes the *internal* situation that is experienced (as opposed to situation selection/modification, which seeks to change the external environment). In terms of the cybernetic control model, this technique operates on the *perception* element of the loop.

> The checkout line at the video rental store is unusually slow, and Robyn can feel the rising temptation to steal some of the snacks that are displayed so prominently

for those waiting in line. She knows that continuing to pay attention to these products is likely to result in even stronger temptation, which may prove to be too great a challenge. Robyn was looking forward to watching the movie she is about to rent, and prefers not to simply walk out of the store without the movie. But the temptation to steal a small pack of candy is growing. Shaking her head, Robyn examines the faces of the people who are in front of her in the line. She decides to play a detective game with herself: trying to guess which movies they came to rent, and then verifying her guesses by seeing which movies they hold – without being seen by any of them. This game amuses her and keeps her mind off the products that are around her, until it is her turn to pay for her movie rental and leave the store.

In this example, Robyn selectively turned her attention towards certain aspects of the situation that she was in, and away from others. By doing this, she prevented the generation of undesirable impulses and behaviors while promoting desirable ones, even without changing the external situation that she was in. By strategically directing her attention, Robyn weakened the link between attending to the temptation-eliciting stimuli and the undesirable goal that it usually activates. In order to control their attention, people may make internal changes (e.g., through distraction or concentration) or external changes (e.g., by covering the eyes or ears). This method of self-control is one of the earliest self-regulatory abilities that appears in the course of lifespan development (Rothbart, Ziaie, & O'Boyle, 1992), and commonly continues to be used from infancy through adulthood, particularly when it is not possible to select or modify one's situation. For other examples of attention deployment techniques, see Table 16.2.

### *Cognitive Change*

At times, people discover that they must attend to (or are unable to turn their attention away from) problematic situations or objects, which may give rise to counterproductive impulses and behaviors. Nevertheless, even in such difficult situations, it is possible to change the way in which one thinks about the situation, in order to alter the impulses that are generated in response to perceiving it. *Cognitive change* refers to the family of self-control techniques by which people can either strategically transform the relevance of a stimulus to their goal, or change the goal against which they compare the stimulus. In terms of the cybernetic control model, this technique operates on the *goal/comparator* elements of the cybernetic loop.

Robyn, whose efforts to avoid shoplifting have been successful for a few weeks, is accompanying a friend to the farmer's market. The sun is shining, a light breeze is blowing, a local music band is playing on a small stage, and the produce in the stands is practically glowing with wholesomeness. Robyn, thoroughly enjoying herself, catches herself considering the best time to snatch a few fruits without the stall owner's attention. Dismayed, she seeks a way to curb the temptation. Robyn studies

the stall owner's face, imagining the work he must have put into growing the fruit, and then packing and driving the fruit to the market. She imagines how upset she would be if she knew that something she has spent months growing was stolen from her. The thought of stealing fruits becomes less exciting, less appealing. Instead of being adventurous and exhilarating, the thought of successfully stealing the fruits makes Robyn feel almost sad. Robyn watches the stall owner for a short while, and walks away feeling good about herself—having given him the gift of not stealing from him.

In this example, Robyn strategically changed how she thought about her situation in order to elicit more desirable reactions and less undesirable reactions, even without changing the situation or shifting her attention away from it. Specifically, Robyn *reconstrued* her experience and changed the meaning of her choice. By considering how the "successful" carrying out of her impulse would impact another person, Robyn changed the relative appeal of the behaviors she was choosing between (to steal or not to steal). In an empirical test of this method, undergraduate students who were performing a math task were distracted by comedy video clips. Half of the students were encouraged to think about the situation differently, in order to change its meaning for them. Students who were instructed to think of the distracting comedy clips as a test of willpower were less distracted by them, and showed less enjoyment when they did attend to them—possibly as a result of perceiving themselves as failing on their own test of willpower (Magen & Gross, 2007). For other examples of cognitive change techniques, see Table 16.2.

### *Response Modulation*

There are times when a powerful temptation may strike without warning, or when a situation progresses steadily and unavoidably towards the production of a destructive impulse, without giving one the chance to select or modify the situation, without providing an opportunity to attend to innocuous elements of the situation, and without leaving room for cognitive change. Even at times like these, people do not necessarily give in to the temptations that present themselves. *Response modulation* refers to the family of techniques by which people attempt to directly control their behavior despite the impulse that they experience to act in a certain way, by figuratively (or literally) clenching their teeth and willing themselves to behave in a manner that is more aligned with their own long-term goals. In terms of the cybernetic control model, this technique operates on the *behavior* element of the cybernetic loop.

Robyn is waiting to meet a friend in a café near a book store. The friend calls to say she will be 10 minutes late, and Robyn decides to visit the book store. She notices a new book that she has been eagerly anticipating, and leafs through it. It's entertaining, and she decides that she would like to have it. But, alas, she did not bring her wallet with her. No matter, the familiar voice inside Robyn's head whispers,

why not just drop the book in her bag and stroll out of the store? She looks around her automatically, and determines that nobody would notice her if she acted then and there. Her pulse quickens. This would be fun, the familiar voice says. You deserve it. Robyn is unable to turn her attention away from the book and does not have the wherewithal to think about the situation in a new way. Instead, she swallows hard, and forces her legs to take her away from the tempting bookshelf and out of the book store. Sitting at a table in the café, Robyn is able to start thinking clearly again.

In this example, Robyn acted in a way that was in opposition to the impulse she was experiencing. After leafing through the book, Robyn experienced a strong urge to steal it (perceiving the book activated a shoplifting goal), but she did not comply with this urge. Unlike any of the other families of self-control methods, this technique does not aim to modify the tempting aspects of the situation—instead, when applying response modulation, one is directly opposing the *reaction* to a temptation that is already powerfully present. This form of self-control has been studied in a variety of contexts (e.g., Muraven, Collins, & Neinhaus, 2002), promoting the theory that the capacity for response modulation relies on a limited internal resource, which becomes depleted as a result of prior efforts, much like a muscle that becomes tired following exertion. According to this approach, depleting self-regulatory resources leads to short-term reductions in the ability to successfully apply this form of self-control (but cf. Martijn, Tenbèult, Merckelbach, Dreezens, & de Vries, 2002). For other examples of response modulation techniques, see Table 16.2.

## Situation- and Person-Specific Considerations in Selecting Techniques of Self-Control

The temptations that people face in everyday life are as different from one another as the individuals who face them. It seems safe to assume that some methods of self-control may be better suited to handle certain kinds of temptations, but how can we know which methods to apply in response to a given temptation? In answering this question, we consider the features of two key players of every situation in which a person is tempted, namely (a) the situation and (b) the person. In this section we provide an example of ways to think about matching situations and individuals with methods of self-control, based on the features of the situation in which the temptation arises, as well as the state and personality of the person facing the temptation.

### *Situation-Specific Considerations*

Situational context has proven to be a shy, elusive animal, and social scientists have yet to create a clear system of classifying the infinite number of possible situations

into a finite number of discrete categories (Cantor, Mischel, & Schwartz, 1982; Yang, Read, & Miller, 2006). Conscious of the enormous complexity surrounding this topic, we do not aim to provide a complete and general taxonomy of situational contexts in this chapter. Instead, we will consider only two attributes of situations that give rise to challenges for self-control, namely *predictability* and *duration*. These two factors may vary independently of each other, resulting in four basic scenarios: predictable brief temptations, predictable extended temptations, surprising brief temptations, and surprising extended temptations. We now turn to discuss ways in which varying each of the two factors will influence one's choice of self-control techniques, and then suggest an optimal sequence of self-control techniques for the "worst-case scenario"—namely, encountering a surprising, temporally extended temptation.

*Predictability.* When the time or location of a potential temptation can be predicted, it is possible to take preemptive measures, rather than relying on direct response modulation alone. If Eddie knows that he is prone to surf the Internet instead of practicing his oboe (but believes that practicing his oboe is more important in the long term), he may ask his brother to disconnect the wireless router until the evening (situation modification). This would be preferable to telling himself that when he is tempted to surf the Internet he will simply resist that temptation and practice his oboe (response modulation). By modifying the situation, Eddie can take the sting out of the temptation even before it presents itself. We propose that, in preparing to tackle an approaching temptation, successful interventions include elements of situation selection/modification, as well as cognitive change. Planning to rely on response modulation or attention deployment alone may lead to dire consequences, especially if the approaching temptation is likely to be long-lasting, since these methods are generally difficult to sustain (Muraven & Baumeister, 2000; Muraven, Collins, & Neinhaus, 2002; Shiffman, 1984).

When a temptation appears without warning, the initial choice of self-control techniques is significantly limited, as situation selection/modification is typically impossible, and even attention modulation and cognitive change may not be viable alternatives when one's attention is riveted by the temptation. Learning to apply response modulation is a crucial skill for these situations. Effective response modulation may be sufficient when dealing with a brief challenge of self-control (e.g., having to swallow nasty-tasting cough syrup). However, relying *solely* on response modulation may prove insufficient when dealing with temporally extended temptations, and may even be counterproductive, as we discuss in the "worst-case scenario" section.

*Duration.* As we have already mentioned, some methods of self-control are more appropriate to use when resisting brief temptations, but may be counterproductive when resisting temptation for long stretches of time. When a self-control challenge is only present for a short while (e.g., having to swallow nasty-tasting cough syrup, donating blood and waiting for the first needle prick) response modulation and attention deployment can be useful and effective, as they can be activated very quickly and

without much preparation (e.g., quickly putting a spoonful of syrup into one's mouth and swallowing, averting one's gaze). However, when the temptation remains present in the environment for an extended period (e.g., getting distracted by a conversation at the next table while dining with a distressed friend), such simple and direct methods of self-control may prove insufficient. For temptations of longer duration, situation selection/modification and cognitive change are more adequate methods of self-control, as they change the reactivity to the object of temptation, rather than only the response to it.

*The worst-case scenario.* While response modulation in itself may enable one to withstand brief exposures to powerful temptations, exclusive and long-term reliance on response modulation is not likely to be successful (Muraven & Baumeister, 2000; Muraven, Collins, & Neinhaus, 2002; Shiffman, 1984), as it is draining both psychologically (Gross, 2002; Muraven, Collins, & Neinhaus, 2002; Muraven, Tice, & Baumeister, 1998; Richards & Gross, 2000) and physiologically (Gross, 2002). Instead, response modulation can be used as a buffer against the destructive urge, providing one with time to implement more sustainable techniques, such as situation modification or cognitive change.

Based on our analysis, the worst-case scenario involves a surprising, extended exposure to a source of temptation—for example, a person who is trying to avoid caffeine despite loving coffee, whose cup was filled with black coffee by a passing waiter. The aromatic coffee beckons, but he does not want to drink it. He prefers not to get up and leave his table, and spilling the coffee onto the floor doesn't feel like a viable alternative. In a surprising, extended situation such as this, we propose that an optimal response may be to resist the immediate urge through the use of response modulation (e.g., push the cup to the other side of the table, rather than towards oneself), and then reduce the urge through the use of cognitive change (e.g., imagining that the coffee has been sitting in the coffee maker for a long time, or that worms are wriggling at the bottom of the cup) and attention deployment (setting up the menu to hide the coffee, trying to guess how many customers are in the diner), and, when circumstances permit, through situation modification (e.g., asking a passing waiter to remove the coffee cup).

## *Person-Specific Considerations*

A variety of person-specific factors may impact a person's susceptibility to temptation, as well as the ability to successfully apply any particular method of self-control. We broadly divide these internal factors into two groups: (a) transient internal factors (such as cognitive load, intoxication, and sexual arousal), and (b) stable internal factors (such as personality traits and age). We discuss examples from each of these categories, and ways in which internal context informs the choice of self-control methods.

*Transient internal factors.* Transient internal states that result in impaired cognition drive people to rely on their environment in order to determine their own behavior to a greater extent than they usually do. When this effect is understood and appreciated, proper planning (in the form of situation selection and situation modification) can help minimize the threat that these situations may pose. However, people often underestimate the magnitude of this effect, resulting in poor preparation and subsequent self-destructive (or other-destructive) behavior.

Certain states of mind are notorious for their deleterious effect on self-control. Psychological researchers are familiar with the notion of generalized cognitive load, and may wonder how it would impact self-control. Two well-established harbingers of poor self-control are intoxication and sexual arousal. Is there a way to prepare for temptations that we may encounter while in those states? In this subsection, we briefly review the relevant research findings and outline possible ways of preparing for such occurrences.

*Cognitive load* occurs when a person's cognitive resources are taxed (e.g., being asked to hold a random digit string in memory while naming the capitals of different countries). The effect of cognitive load on self-control is not straightforward, but a number of studies suggest cognitively taxed individuals become more reliant upon salient environmental cues to guide their behavior—a reliance which can promote either low or high degrees of self-control, depending on the cues that are present (Mann & Ward, 2004; Parent, Ward, & Mann, 2007; Westling, Mann, & Ward, 2006).

*Intoxication* impacts self-control in a manner similar to that of cognitive load. Despite the common notion that intoxication leads to impulsive behavior, research suggests that the main effect of intoxication is similar to that of cognitive load (Casbon, Curtin, Lang, & Patrick, 2003; Ditto, Pizarro, Epstein, Jacobson, & MacDonald, 2006; MacDonald, Fong, Zanna, & Martineau, 2000), by causing behavior to become more dependent on external cues. In other words, behavior while intoxicated can become either less or more restrained than behavior while sober, depending on the nature of the environmental cues that are present.

*Sexual arousal*, as it influences self-control, has only been studied in a small number of experiments. In those studies, sexual arousal had a decidedly deleterious impact on self-control, by heightening impulsive behavior (Ariely & Loewenstein, 2006; Wilson & Daly, 2004). However, we are unaware of studies that tested whether the detrimental effect of sexual arousal on self-control can also be explained in terms of cognitive load and dependence on external cues (i.e., given that sexual arousal is usually the result of exposure to sexually arousing cues, sexually aroused people may be more likely to be surrounded by cues that suggest sexual behavior).

People appear to underestimate the magnitude of the effect that transient internal changes such as cognitive load, intoxication, or sexual arousal will have on them (Gilbert, Gill, & Wilson, 2002; Loewenstein, 1996; Nordgren, van der Pligt, & van Harreveld, 2006). This phenomenon, which Loewenstein (2005) labeled "the empathy gap," may be the most pernicious aspect of transient vulnerabilities of the sort we discuss here. The bulk of the evidence suggests that the best strategy may be to rely heavily on

situation selection in preparation for times in which cognition may be impaired, and to rely on situation modification while in these states. Thus, before drinking with a group of friends, one would be wise to avoid carrying car keys, credit cards, or large amounts of cash, all of which could lead to a variety of problems in the hands of an individual who is (temporarily) extremely suggestible. Similarly, before going on a date with an attractive but unknown stranger, one would be wise to ensure the availability of contraceptives, rather than relying on their own sound judgment in the moment of truth, should sex become a viable possibility. Unfortunately, people are not likely to create safe environments in advance if they do not realize the extent to which their future behavior will depend on external cues.

*Stable internal factors.* In contrast with the relatively transient internal states that we reviewed earlier (cognitive load, intoxication, or sexual arousal), some internal factors are much more persistent, thereby constituting a relatively stable personality. We propose that personality and self-control interact with each other in important ways. Specifically, personality plays a key role in determining what constitutes a temptation for a given person, how powerful the temptation is, and which self-control techniques are most helpful in resisting the temptation. In addition, we propose that the flow of influence between personality and self-control is not one-directional, but reciprocal: Over time, the self-control an individual exerts shapes that individual's personality in important ways.

The psychology of individual differences has concerned itself with an astonishing number of putative traits, and considering the significance of even a fraction of those is beyond the scope of this chapter. For illustrative purposes, in the following examples we will refer to the widely used Big 5 dimensions of personality (John & Srivastava, 1999), as well as the more specific traits of impulsivity and temporal discounting. We then turn to discuss lifespan development considerations when choosing specific techniques for self-control.

*Personality determines what constitutes a temptation for a given person.* We have already defined temptation as a situation in which the goal of experiencing a relatively small short-term gain is competing with the goal of experiencing a relatively large long-term gain. In other words, temptation exists whenever an immediately available outcome is appealing enough to risk abandoning a delayed outcome that would be even more appealing if it were immediately available. Personality traits determine the appeal of both long-term and short-term rewards, thereby determining whether such a conflict exists.

As an example let us return to Eddie, who is sitting in his room, working on his homework for the next day. Eddie promised his parents that he would finish all of his homework before dinner, and knows that his parents will ask him during dinner whether he kept his promise. But the homework is boring and unsatisfying, while outside an exciting street-soccer game is starting to form, and Eddie's friends are playing. Eddie is facing two basic alternatives: go outside and play (and not complete the homework before dinner), or continue working on the homework (and not go out to play).

Consider the different ways in which Eddie may experience his alternatives, based on his personality. If Eddie is highly extraverted, going to play with his friends would

seem very appealing. Conversely, if Eddie is very introverted, the game would have no special allure. Similarly, if Eddie is highly conscientious, he may feel bad about breaking his promise to his parents (or lying to them at the dinner table), whereas if Eddie is not conscientious, he would have no compunction about either. Lastly, if Eddie is highly neurotic, the potential of being caught would have a distressing effect on him, whereas if Eddie is not neurotic at all, the risk itself would not be a cause of great distress. In this example, Eddie's extraversion, conscientiousness, and neuroticism operate in concert to determine the appeal of the immediate and the delayed consequences. He may experience no temptation at all (either by not finding the game appealing, or by not seeing any problem with playing and breaking his promise and/or lying about it), or he may experience some temptation (by finding the game appealing, but finding the promise-breaking problematic), depending on how appealing or unappealing each of the consequences appear to him.

*Personality also determines how powerful a temptation is for a given person.* Since personality traits determine the appeal of the possible consequences, they serve to determine not only *if* a temptation exists, but also the *strength* of the temptation (i.e., the relative appeal of the immediate alternative as compared with the delayed alternative). If Eddie is only somewhat extraverted, the temptation to go out and play would be relatively weak, whereas if Eddie is extremely extraverted, the temptation to go out and play would be relatively strong.

*Personality determines which self-control techniques are likely to be most helpful in resisting temptation.* Consider two related traits that are often brought up in the context of self-control: impulsivity and temporal discounting. Impulsivity can be broadly defined as "a tendency to act rashly and without consideration of consequences" (Dawe, Gullo, & Loxton, 2004, p. 1394). Temporal discounting (Ainslie, 2001) is related to impulsivity (Kirby, Petry, & Bickel, 1999), and represents the extent to which an individual perceives events in the far future to be less important than similar events in the near future, based solely on the greater time that will pass before they occur.

Individuals who exhibit higher rates of temporal discounting tend to be more influenced by the availability of immediate reward, and may thus experience a greater temptation to choose immediate gratification. However, even when people display high rates of temporal discounting, they are still able to orient towards the larger-later rewards when making choices long before any of the rewards are immediately available (Kirby & Herrnstein, 1995). This suggests that people who are highly impulsive and/or exhibit high rates of temporal discounting may especially benefit from employing preemptive techniques for self-control (such as situation selection), as compared with techniques that aim to deal with an already present temptation (such as attention deployment or response modulation). In addition, our group has recently found that changing the meaning or representation of the available alternatives (through cognitive change or situation modification) can effectively reduce rates of impulsive choice when choosing between immediately available small rewards and delayed larger rewards (Magen, Dweck, & Gross, 2008).

*An individual's self-control impacts that individual's personality in important ways.* Perhaps the most striking example of the reciprocal influence between self-control and personality can be seen in the case of substance abuse. While it is generally accepted that impulsive people are more likely to engage in substance abuse (e.g., Hoffman et al., 2006; Kirby & Petry, 2004; Mitchell, Fields, D'Esposito, & Boettiger, 2005; Reynolds, 2006), a growing body of literature demonstrates that engaging in substance abuse results in increased impulsivity, most likely due to long-term effects on the brain's reward mechanisms (Moeller & Dougherty, 2002).

*Lifespan developmental stage.* It is important to consider lifespan development when choosing a self-control method to implement when facing temptation. How does the developmental stage of an individual constrain the choice of viable self-control methods? What ways are there to provide adequate support for such developmental limitations? Children as young as 4 years of age may be capable of employing a wide range of self-control methods, including such sophisticated methods as situation selection and cognitive change. However, people who are limited due to developmental constraint will benefit from external initiation of the self-control process, as well as guidance with respect to the details of implementation ("imagine that the pretzels are actually logs" rather than "imagine how crunchy and salty the pretzels are"). In this way, selecting age-appropriate self-control methods, and adapting methods that would be challenging for a given developmental stage (by providing scaffolding in the form of reminders and rehearsals), can improve the likelihood of successfully resisting temptation.

Children are less capable of exerting self-control than adults (Pressley, 1979), a capacity which they develop as they age. When in the presence of an object that implies a certain behavior, even when they are aware that they should not perform it, children are more likely than adults to do so. When children are in the presence of forbidden food, they will eat it; when faced with a forbidden toy, they will play with it (Craik & Bialystok, 2006; W. Mischel, Shoda, & Rodriguez, 1989). In terms of the cybernetic process, such utilization behavior can be described as perception activating a goal, resulting in an impulse to utilize the tempting object, which leads to that behavior.

Some interventions may require modifications when used with children. Because children's behavior is influenced so strongly by their environment, external support and guidance are crucial when helping a child exert self-control. Situation selection/modification remains a viable option for self-control, even for young children, but may require external guidance with young children. Study participants as young as 6–7 years of age have displayed an understanding of factors which may make temptations easier or harder to resist (Choe, Keil, & Bloom, 2005; H. N. Mischel & Mischel, 1983), although younger children tended to believe that counterproductive methods (e.g., watching the tasty forbidden treat) would help them exert more self-control. Supervision by a caretaker may be necessary in order to help children select (or modify) situations in a way that would create an environment that would support their long-term goals.

Cognitive change, another high-leverage method of self-control, requires a measure of cognitive flexibility, an ability which has been consistently shown to be age-dependent,

and to improve throughout childhood. Although children younger than 3 years of age exhibit a limited capacity for set-switching tasks (Zelazo, 2004), some ability is already apparent in children as young as 4 years of age (Deák, Ray, & Pick, 2004). The ability to flexibly switch to a new set of rules reaches adult levels of performance by the age of 12, and the ability to steadily maintain the new representation reaches adult levels of performance around age 14 (Crone, Ridderinkhof, Worm, Somsen, & van der Molen, 2004). These findings correspond with those of researchers studying neurodevelopment, who have shown that the prefrontal cortex—a brain area that is implicated in response inhibition and cognitive restructuring (Ochsner & Gross, 2004), as well as goal updating (Badre & Wagner, 2004)—develops continuously from birth and until young adulthood (Giedd et al., 1999; Sowell, Thompson, Holmes, Jernigan, & Toga, 1999; Thompson et al., 2000).

Social support, through reminders about the new way of interpreting the situation (such as thinking about tasty forbidden treats as pictures or inedible objects), facilitated performance in all cases in which children exhibited any capacity for set-switching (Crone et al., 2004; Deák et al., 2004; Patterson & Mischel, 1976). Goal verbalization (being provided with a concrete phrase to repeat when faced with temptation, which included a reminder of the goal) was of greater benefit than simply being provided with stated goals or with distracting behaviors (Genshaft, 1983; Patterson & Mischel, 1976). These findings suggest that cognitive change could be beneficial even for young children, with the help of caretakers who can remind children of more helpful construals for the situation they are experiencing (Feindler, Marriott, & Iwata, 1984).

Very little is known about changes in self-control throughout the adult lifespan. Although researchers agree that older adults tend to display more utilization behavior than young adults, and that cognitive flexibility diminishes as one progresses through adulthood (Craik & Bialystok, 2006), we have encountered difficulty in finding empirical reports of tests for self-control in older adults. We were able to locate only a single study on this topic, which longitudinally tested for changes in self-reported self-control (Cramer & Jones, 2007). Over the course of approximately 65 years, almost 75% of the participants reported improvement in self-control, while most of the remaining participants reported decrements in self-control. Despite the decline of some cognitive skills, participants reported an improved capacity to exert self-control—an improvement that can perhaps be attributed to the generally recognized improvement in emotion regulation that accompanies aging (Carstensen, Fung, & Charles, 2003; Charles & Carstensen, 2007; Gross et al., 1997).

## Concluding Comment

In this chapter we have presented the cybernetic process model of self-control. The model provides a general framework for representing both the emergence and

regulation of temptations. Although a large body of research has examined a multitude of self-control techniques (see Table 16.2), these techniques have been developed separately, without a unifying framework. The absence of a unifying framework has prevented researchers and practitioners from transferring the principles of interventions from a particular domain (e.g., weight management) to novel interventions in a different domain (e.g., aggressive behavior). By grouping the multitude of known theories and interventions into five discrete types of self-control techniques, the cybernetic process model of self-control creates a common language for researchers and practitioners to use when discussing self-control and temptations, thereby enabling the cross-pollination that is critical for the continued growth of behavioral science.

In addition, we proposed a number of considerations to serve as decision aids when selecting self-control techniques for dealing with temptations. Specifically, we suggested that features of the situation (i.e., predictability and duration) as well as those of the person who is facing the temptation (i.e., transient mental state, stable personality traits, and lifespan developmental stage) are important to consider when selecting the optimal combination of self-control techniques. In doing so, we aim for the cybernetic process model of self-control to serve as a vehicle for translating basic psychological theory into real-world interventions for real-world problems. We hope and trust that such an analysis will empower individuals to pursue their own long-term goals through the wise application of self-control skills. Even little Eddie.

## Note

1 For further details regarding the development of the model, see Magen and Gross (in press).

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# 17

# *Modes of Self-Regulation*

## Assessment and Locomotion as Independent Determinants in Goal Pursuit

**Arie W. Kruglanski, Edward Orehek, E. Tory Higgins, Antonio Pierro, and Idit Shalev**

In a general sense, the notion of self-regulation refers to the governing and directing of attention, resources, or actions towards one's adopted goals. This is consistent with the everyday conception of goal-directed action, in which a person is thought to evaluate available pursuits, select the most desirable option, and engage in behaviors designed to attain the goal. For example, a person may consider various potential life paths following graduation from high school and ultimately decide that he or she would like to earn a bachelors degree, which would then lead to behaviors such as attending (often boring) lectures and reading (often dry) textbooks. Such understanding of self-regulation makes two functions apparent. First, the person *assesses* the value of potential goals and the various means that serve each goal. Second, the individual *locomotes*, or moves away from, the current state towards a desired goal state. As such, assessment and locomotion as a body form part and parcel of all self-regulatory activity.

Assessment refers to a determination of the rate, amount, size, value, or importance of something; it concerns critical appraisal for the purpose of understanding or interpreting, or as a guide in taking action. Thus the value or importance of both the current state and the end state can be independently assessed, and so can the value or utility of the means used to move toward or away from that end state. According to regulatory mode theory, assessment "constitutes the comparative aspect of self-regulation concerned with critically evaluating entities or states, such as goals or means in relation to alternatives in order to judge relative quality" (Kruglanski et al., 2000, p. 794). For example, an individual may assess preferences among alternatives, and how well he or she performed in the past. Individuals strong in assessment mode are preoccupied with these kinds of comparative judgments.

By contrast, locomotion refers to moving from place to place. According to field theory (see Deutsch, 1968; Lewin, 1951) locomotion concerns any change of position occurring in any region whatsoever within the life space. Thus the main concern of persons high on the locomotion dimension is simply to move in an experiential or psychological sense. According to regulatory mode theory, the locomotion mode "is the self-regulatory aspect concerned with movement from state to state and with committing the psychological resources that will initiate and maintain goal-directed progress in a straightforward manner, without undue distractions or delays" (Kruglanski et al., 2000, p. 794). In the locomotion mode, individuals emphasize "getting on with it," and "making something happen" rather than engaging in critical evaluation. Indeed, individuals strong in the locomotion orientation might refrain from critical evaluation if stopping to reflect impedes continuous movement from state to state, and instead "just do it." As such, locomotion involves merely moving away from a current state, with no particular direction or destination in mind. As the intent to locomote gets translated into the specifics of actual movement, the direction of the motion will become determined, but the specific destination might still be left indeterminate.

An individual's temperament and socialization result in varying degrees of concern for the locomotion and assessment modes. These individual differences in locomotion and assessment tendencies have been measured using the Regulatory Mode Questionnaire (RMQ; Kruglanski et al., 2000). Importantly, a person's chronic level of assessment is orthogonal to his or her chronic level of locomotion. This shouldn't be surprising. After all, the reasons why individuals may crave movement or progress (i.e., locomotion) would seem quite unrelated to reasons why they may develop a concern for standards and for critically evaluating alternatives (i.e., assessment). Because of such independence, it is possible for individuals to be high on both assessment and locomotion, low on both, or high on one and low on the other.

Within a general personality architecture (Cervone, 2004), assessment and locomotion best belong in the category of self-regulatory systems identified by Mischel (1973). More specifically, they pertain to generalized modes of self-regulation, representing broad emphases regarding the way in which goals are pursued. High (vs. low) assessors' preferred mode of self-regulation consists of appraising; that is, carefully evaluating potential moves against standards and alternatives. In contrast, high (vs. low) locomotors' preferred mode of self-regulation consists of doing; that is, carrying out acts believed to promote rapid advancement toward goal attainment. In other words, the assessment and locomotion constructs pertain to self-regulatory functions that may receive different degrees of emphasis in the course of goal pursuit. As such, they occupy a middle ground between general personality patterns tapped by the Big Five personality factors (McCrae & Costa, 1987) and specific values, goals and standards differentiating among individuals. In this way, higher order personality traits (e.g., the Big Five) may serve as strategic channels for the satisfaction of the regulatory modes.

In addition to individual differences in the chronic degree of assessment and locomotion, situations may arouse the operation of one mode over the other. In this sense, assessment and locomotion represent both individual difference and situational

variables. For example, time pressure may heighten locomotion tendencies, whereas the presence of a critical observer may heighten assessment tendencies. Previous research has manipulated regulatory mode by having participants recall times in which they engaged in assessment or locomotion. The recall of such instances is assumed to activate the mode associated with the memories, priming the participants to regulate their subsequent behavior in line with the activated mode (Avnet & Higgins, 2003).

Although these two functions of self-regulation are contained in all major models of self-regulation (see Carver & Scheier, 1990; Gollwitzer, 1990; Higgins, 1989; Kuhl, 1985; Miller, Galanter, & Pribram, 1960; Mischel, 1974, 1981), they are typically construed as functionally interdependent parts of a single self-regulatory process rather than the independent modes we have outlined here. According to such an analysis, the relative emphasis on assessment and locomotion should work in harmonious concert, jointly covarying with the perceived importance of a given self-regulatory activity. For example, control theory (Carver & Scheier, 1990) suggests that individuals continually assess the discrepancy between a current state and a desired state, and the detection of such a discrepancy instigates locomotion to reduce the discrepancy, with continuous assessment of the rate and state of progress towards the goal, terminating locomotion when the standard has been reached. These feedback loops are conceptualized in such a way that locomotion cannot commence until a discrepancy has been detected, with locomotion always directed towards a specified end. Moreover, assessment of progress and locomotion towards the goal are jointly carried out in parallel.

In contrast, regulatory mode theory suggests that the independence of the two modes operates such that assessment and locomotion can work in opposition to each other in the demand for resources (e.g., time, energy, attention), leading to the inhibition of one mode in favor of the other. Sometimes, the detection of a discrepancy leads to rumination about past failures or a pessimistic assessment of the attainability of the goal, leading to stagnation rather than forward movement. At other times, the desire for locomotion may lead to hastened movement towards the first accessible activity without the consideration of alternatives. Similarly, the momentum gained from locomotion may lead the person to continue beyond the original goal that was set without monitoring the progress that was made. Hence, compared to classic theories of self-regulation, regulatory mode theory is concerned with the assessment and locomotion functions more generally and as independent from one another. (For a review of the differences between regulatory mode theory and other self-regulatory constructs, see Higgins, Kruglanski, & Pierro, 2003).

The independence of the two modes allows for a possible predominance of one mode over the other. Generally, assessment should lead to greater consideration of possible routes to goal pursuit, guiding the self in specified directions. However, a person operating predominately in the assessment mode may engage in excessive musing, always looking but never leaping. Generally, locomotion should improve the performance of many tasks through its emphasis on doing something, increasing attainment. However, a person operating predominately in the locomotion mode may engage in much activity without any particular end in mind, essentially running around

like a chicken with its head cut off. Optimal self-regulation should usually utilize both modes of the self-regulatory system. For example, assessment should significantly contribute to goal attainment by exerting a guiding constraint on locomotion. As such, blind locomotion may often result in various mistakes, potentially avoidable if a modicum of assessment was in place. Similarly, the assessment of the best goal and the most appropriate means of attaining it is not beneficial unless the individual engages in locomotion towards the goal.

The operation of the regulatory modes has implications for attitudes, perceptions, emotions, and behaviors for individual goal pursuit, interpersonal relations, organizational processes, and cultural differences. We will review the evidence for the distinct influence of locomotion and assessment in each of these domains as derived from regulatory mode theory as well as the evidence for the complementary role the two modes play in self-regulation. The review locates the modes in a general personality architecture while also suggesting that the activation of each mode is jointly determined by individual differences and situational forces.

## Individual Goal Pursuit

Individual goal pursuit represents quintessential self-regulation, with the assessment and locomotion modes used as methods of guiding the self towards desired ends. As discussed above, regulatory mode concerns the "how" question in goal pursuit, with locomotion and assessment leading to distinct ways of pursuing goals. High locomotion should be associated with greater effort invested in activities that afford movement, whereas high assessment should be associated with greater effort invested in activities that afford comparisons and critical thinking. In addition, locomotion and assessment should be associated with different strategies for deciding among alternative goals and means. The preference for forward movement should lead high locomotion to be characterized by a preference for activity flow. Because locomotion should be associated with perpetual movement, it should also be negatively related to counterfactual thinking and regret, as each would disrupt the flow of activity. In contrast, assessment should be positively related to counterfactual thinking and regret, as well as critical and comparative thinking about the self, influencing the way in which the self is perceived. Most tasks should require the successful operation of both modes, such that the most functional self-regulation should utilize both modes in a complementary fashion.

### *Effort Investment*

Some activities should naturally afford locomotion, whereas other activities naturally afford assessment. Taylor and Higgins (2002) investigated the types of goals that would

fall into each category and measured the extent to which locomotion and assessment were correlated with effort devoted to each activity. In the first phase of the study, an initial sample generated potential activities. In the next phase, a new sample rated the reason for doing each activity. To assess the link between locomotion and each activity, participants rated the extent to which the reason for doing the activity is "because it involves action or movement away from the current situation. It satisfies my need for change, to do something, anything different, regardless of what I am currently doing." To assess the link between assessment and each activity, participants rated the extent to which the reason for doing the activity is "because it involves evaluating, measuring, or interpreting information. It satisfies my need for critically appraising and evaluating something in order to be sure I am doing it correctly."

Activities primarily associated with locomotion included playing sports, exercising, playing video games, dancing, and partying. Activities primarily associated with assessment included thinking, attending cultural events, academic activities, financial duties, obtaining news, correspondence, and meditation. Activities such as traveling and going places in general were associated equally with locomotion and assessment. In a subsequent study, Taylor and Higgins (2002) tested the relation between scores on the locomotion and assessment scales and willingness to invest energy into four of the activities. Locomotion (but not assessment) scores were positively related to the energy participants would put into the prototypical locomotion tasks of playing sports and exercising. Assessment (but not locomotion) scores were positively related to the energy participants would put into the prototypical assessment activities of financial duties and academic activities.

Together, these studies suggest that some tasks allow greater locomotion whereas other tasks allow greater assessment, and individuals are willing to invest more energy into tasks that fit their regulatory mode. That is, locomotors are willing to invest more energy into tasks that allow for movement than into tasks that allow for critical evaluation, while assessors are willing to invest more energy into task that allow critical evaluation than tasks that allow for movement.

### *Judgment and Decision Making*

Deciding among a set of alternative goals or means can be conducted through two common strategies relevant to locomotion and assessment. First, through progressive elimination, the decision maker may evaluate the options based on the most important attribute and eliminate the object with the lowest perceived value on this attribute. Then, the decision maker would do the same for the second most important attribute, followed by the third, and so on until a single item remains. This decision strategy should fit locomotion because the process changes the set of the alternatives at the conclusion of each phase, signifying movement. This strategy should not fit assessment because each phase results in fewer items to be evaluated, which reduces the number of comparisons that can be made. Another common strategy is the full

comparison approach, in which every alternative is compared on all relevant attributes. The decision is then made based on a complete evaluation of all attributes. This decision strategy should fit assessment because it creates as many comparisons as possible, leading to maximum evaluation, but should not fit locomotion because it signifies a lack of progress.

In order to test the above predictions, Avnet and Higgins (2003) manipulated participants' situational levels of locomotion and assessment by having them recall instances in which they acted in accordance with one of the modes. To do this, participants were presented with 3 of the items from the regulatory mode questionnaire (Kruglanski et al., 2000), and were asked to think about a time they behaved in a manner consistent with the item, and to briefly describe the episode. Participants were then presented with an array of reading lights and asked to select the one they would prefer to own (all participants selected the same, superior light). Consistent with the hypotheses, participants in the locomotion condition were willing to pay more for the reading light when it was chosen using the progressive elimination strategy than when it was selected using the full comparison strategy, and were willing to pay more than participants in the assessment condition who used the full comparison strategy. Conversely, participants in the assessment condition were willing to pay more for the reading light when it was chosen using the full comparison strategy than when it was selected using the progressive elimination strategy, and were willing to pay more than participants in the locomotion condition who used the full comparison strategy. This suggests that locomotors experienced regulatory fit (Higgins, 2000) when using the progressive elimination strategy and assessors experienced regulatory fit when using the full comparison strategy, increasing the value of the reading light due to the positive experience of making the decision using a strategy consistent with their active regulatory mode.

In addition to general fit between a regulatory strategy and a person's regulatory mode, locomotion and assessment should orient people toward different features of potential choices when making decisions. Because high (vs. low) locomotors prefer to remain in perpetual motion, they should pay particular attention to the expectancy of attainment that each goal provides because attainable goals promise reliable movement, whereas unattainable ones signal possible obstacles or thwarting of movement. In contrast, high (vs. low) assessors should pay particular attention to a goal's value or importance because of their concern with pursuing the right goals, the best goals, or the goals that will reflect on them most positively if attained.

To test this possibility, Kruglanski et al. (2000) asked participants to list five personal attributes they wanted to attain. Participants listed attributes such as "outgoing" and "knowledgeable." Next, participants were asked to list all the means they could use to attain each goal. Finally, they rated the value of the goal and their likelihood of attaining the goal. Consistent with the hypotheses, locomotion was positively related to the attainability of the goals listed, but was unrelated to the perceived value of the goals. In addition, assessment was positively related to the perceived value of the goals, and negatively related to the attainability of the goals.

These results support the hypothesis that locomotors prioritize attainability over value, whereas assessors prioritize value over attainability.

An orientation towards different aspects of means and goals should lead locomotion and assessment to differentially relate to the number of means generated and considered when pursuing a particular goal. That is, assessors should prefer to have many potential means to evaluate in order to select the best possible route. Locomotors should not be concerned with such evaluations, and therefore locomotion should not be related to the number of means generated. Supporting this expectation, assessment was positively related to a greater number of means generated for the attribute goals, whereas locomotion was not correlated with the number of means generated.

Although locomotors are not concerned with the critical evaluation of means, they should want to "get on with it." That is, they should prefer to select a means quickly in order to continue moving through tasks rather than getting "hung up" in thoughts regarding the selection of a particular path. Assessors on the other hand should not be concerned with the speed with which decisions are made, but rather with the correctness of each decision. To test this prediction, immediately following their evaluation of the goals' expectancy and value, participants were instructed to type as quickly as possible the best means of attaining their personal attribute goals. As predicted by regulatory mode theory, high (vs. low) locomotion was associated with rapid responses to the query, whereas assessment was unrelated to the speed of response.

Further testing the idea that locomotors would like to "get on with it" and that assessors are willing to wait as long as it takes to find the correct or right option, Klem, Higgins, and Kruglanski (1996) told participants that they would be a part of a "nationwide study on the utility of 9 different tasks for evaluating creativity" and that some students found each task very interesting and some students found each task very boring. Participants were told that there were such wide individual differences in preferences for the tasks that the researchers would provide them with background information on all the tasks so they could choose the task that best suited them. Finally, participants were informed that the software that would provide the background information was not working properly, so it would take 5 minutes or more for the information to appear on the screen. However, if they would like, they could start one of the tasks immediately by pressing a number between 1 and 9. If they chose to wait and grew tired of waiting, they were told they could press a number between 1 and 9 at any time to begin one of the tasks. In fact, the background information never appeared on the screen and the waiting time was terminated after 10 minutes.

This design allowed for two dependent measures. The first dependent measure was whether the participant entered a number immediately or waited for background information. The second dependent measure was how long participants who chose to wait lingered before pressing a key to begin. Consistent with the conceptualization of each regulatory mode, locomotors preferred to move, whereas assessors preferred to wait for information that would shed light on the best decision. High (vs. low) locomotors

were more likely to begin a task immediately rather than wait for background information. In addition, assessment was positively correlated with the time spent waiting once the decision to wait was made.

In a second study, Klem et al. (1996) told participants that they would be selecting one task from five possible tasks to complete, with the same cover story regarding the variation among respondents in terms of their interest in each task. In this study there was no delay until participants were presented with background information. Instead, the quality of the background information was manipulated, with low quality information presented in one condition (i.e., where the task was developed, who had developed the task, and the number of items in the task), and high quality information presented in the other condition (i.e., how much other students at their university liked the task, what they would actually be doing in the task, and what types of people would enjoy the task). Participants were instructed that when they asked for information about a task, they could look at one, two, or all three of the different types of information available. At any point, they could begin one of the tasks by clicking its associated key.

This design allowed Klem et al. (1996) to investigate two dependent variables: specifically, the number of tasks considered prior to making a decision and the number of total sets of information studied prior to making a decision served as the dependent measures. Consistent with the results from Study 1, assessment was positively related to both indexes of the amount of information considered, and locomotion was negatively related to both indexes of the amount of information considered. Moreover, assessment was more strongly related to the amount of information processed when the information was of high quality than when the information was of low quality, suggesting that high quality information better fulfills the evaluative aims of those high on assessment.

In order to provide further evidence that locomotors wish to move quickly through tasks and that assessors are concerned with evaluations according to comparative standards, Kruglanski and colleagues (2000) asked participants to engage in a proofreading exercise. During this task, participants were given two copies of a passage, one marked "master copy" and the other labeled "sample copy." Participants, with red pen in hand, were asked to mark any points in the sample copy that were different from the master copy. Consistent with regulatory mode theory, high (vs. low) locomotion was associated with less time spent completing the task, and high (vs. low) assessment was associated with a larger number of errors marked. In other words, locomotion was associated with moving quickly through the task, whereas assessment was associated with critical evaluation and attention to the comparative standard.

Taken together, these results consistently demonstrate, using several different methodologies, that locomotion is associated with a concern for rapid forward progress in decision making, whereas assessment is associated with an exhaustive comparison of possible standards. The strategy used to make a decision can even lead to greater perceived value for alternatives processed using a strategy that fits the currently active regulatory mode.

### *Activity Flow*

In addition to the decision to engage in goal pursuit, locomotion should involve greater commitment to maintain action. Therefore, high (vs. low) locomotors should exhibit a stronger task orientation, which reflects the tendency to attend to an activity and persist conscientiously until completion. Confirming this expectation, locomotion is positively correlated with measures of flow (e.g., "I tend to be quite wrapped up and interested in what I am doing"; Huba, Aneshensel, & Singer, 1981) and vitality (Ryan & Frederick, 1997).

Although a steady flow of activity is likely to characterize the behavior of locomotors, assessors should be more likely to break the flow in order to evaluate, leading to greater distraction, rumination, and postponed movement. In contrast, locomotion should be positively related to maintaining control over one's attention and decision making. As suggested by this analysis, assessment is positively associated with volitional inhibition (tapping such distraction and rumination; Kuhl & Fuhrmann, 1998), while locomotion is negatively associated with volitional inhibition (Higgins, Pierro, & Kruglanski, 2002). In addition, locomotion, but not assessment, was positively correlated with self-regulatory competence and self-maintenance, including maintaining control over attention. Similarly, locomotion was positively related to the behavioral activation system, whereas assessment was positively related to the behavioral inhibition system (Higgins et al., 2002). This suggests that the activation of the locomotion mode heightens the desire to maintain a course of action, whereas the activation of the assessment mode increases the detection of problems and reconsideration of plans.

### *Counterfactual Thinking and Regret*

Assessors' main aim is to decide the best course of action. Because a negative outcome implies having failed to make accurate evaluations, individuals with a strong assessment orientation should be more prone to engage in the generation and consideration of counterfactuals and, as a consequence, to experience more regret about their choice. In contrast, individuals with a strong locomotion orientation are less likely to pay attention to a decision outcome. They want to move on to the next goal pursuit, to just "get on with it" rather than dwell on the past. Therefore, high locomotion should lead to less counterfactual thinking and regret.

To test these predictions, Pierro et al. (2008) conducted three studies. In the first study, participants read a scenario about a computer purchase with a negative outcome. To assess counterfactuals after reading the scenario, participants were asked to write down the thoughts that had come to their mind. Participants also filled out a rating scale measuring regret. In support of the hypotheses, assessment was positively related to both counterfactual thinking and regret, whereas locomotion was negatively

related to counterfactual thinking and regret. To test the hypotheses again, for decisions that the participants had actually made, a second study asked participants to describe a purchase they had made that had a negative outcome. Next, participants responded to an item that read "How much did you regret your purchase?" Finally, participants responded to an item measuring counterfactual thinking:

> When rethinking about negative experiences like the one you described, people often develop thoughts such as "If only . . . it would have gone better." Please indicate how many thoughts like that came to your mind when you originally had the experience you described above.

Participants responded to this item on a scale ranging from 1 (*no thoughts like that*) to 7 (*many thoughts like that*). Replicating the results of the first study, assessment was positively related to counterfactual thinking and regret, whereas locomotion was negatively related to counterfactual thinking and regret.

To provide further support for the hypotheses, Study 3 manipulated locomotion versus assessment by asking participants to recall three times in which they acted as a locomotor or three times in which they acted as an assessor (as in Avnet & Higgins, 2003). Following the manipulation of locomotion or assessment, participants completed the same purchase scenario and the same regret scale as Study 1. Participants also completed the counterfactual thinking item used in Study 2. Participants in the assessment condition reported more counterfactual thinking and regret, as compared to participants in the locomotion condition. In addition, the influence of locomotion and assessment on regret was mediated by counterfactual thinking. This suggests that assessment increases the amount of counterfactual thinking that individuals engage in following a failure, and that such thought leads to feelings of regret. Conversely, locomotion inhibits counterfactual thinking, leading to decreased feelings of regret.

### *Self-Perception*

Similar to their comparisons among goals and means, high (vs. low) assessors should focus on evaluations of their actual self in comparison with alternative standards, including social comparison, self-consciousness, and self-discrepancies. Self-evaluation should be less relevant to high (vs. low) locomotors. Consistent with this prediction, responses to the assessment scale are positively related with responses to scales measuring public self-consciousness, private self-consciousness, and the need for social comparison (Kruglanski et al., 2000). Also as predicted, locomotion bears little or no relation to these variables.

A self-evaluative focus may guide attention to discrepancies between one's actual self as one state and the desired self as an alternative state (Higgins, 1987). As a consequence, high (vs. low) assessors may exhibit more pronounced negative affect and lower optimism and self-esteem. Furthermore, because locomotion (i.e., forward

movement) contributes to a sense of progress, high (vs. low) locomotion may be characterized by a greater degree of positive affect and higher optimism and self-esteem. Consistent with these predictions, research has found that assessment scores are positively correlated with social anxiety and depression, and negatively correlated with self-esteem and optimism (Kruglanski et al., 2002). In contrast, locomotion scores are negatively correlated with social anxiety and depression, and positively correlated with self-esteem and optimism. In addition, assessment is positively related to stress-related feelings (Higgins et al., 2002). Similar to the finding that locomotion is related to lesser regret following poor decisions, locomotion is associated with lesser feelings of guilt and shame following previous failures to do the right thing (Higgins et al., 2002).

In addition to the general increase in negative affect, high (vs. low) assessors should exhibit greater emotional instability than high (vs. low) locomotors because they may perpetually evaluate themselves, and such evaluations may evoke varying affective reactions. The varying reactions are likely due to the large number of comparative standards used, including times in which the self exceeded the comparison point and times in which the self fell short of the standard. Indeed, assessment is positively correlated with emotional instability among American and Italian respondents (Kruglanski et al., 2002), as well as Germans (Higgins et al., 2002).

Even though assessors are likely to experience negative and unstable affect as a result of their constant evaluations, the evaluations are carried out in an attempt to attain accuracy in judgments and decision making. In order to feel that one is correct, it is necessary to feel certain about the conclusions one has reached. Ambiguity regarding the best option should be unsettling for assessors who are striving to determine the best or right course. Therefore, assessors should be uncomfortable with ambiguity. In two empirical tests of this hypothesis (Higgins et al., 2002; Kruglanski et al., 2002), assessment was positively related to the discomfort with ambiguity subscale of the Need for Cognitive Closure Scale (Webster & Kruglanski, 1994), whereas locomotion was unrelated to discomfort with ambiguity.

Considered together, this body of research strongly supports the notion that assessment is characterized by increased attention to comparative standards, whereas locomotion is characterized by a lack of such comparisons. The result for assessors is greater vulnerability to negative appraisals and instability regarding such appraisals. Locomotors, on the other hand, seem to be relatively invulnerable to negative appraisals and instability because they are not critical of their performance. Instead, greater locomotion seems to be characterized by greater optimism and self-esteem, facilitating attention towards forward progress.

### *Achievement*

Successful self-regulation towards one's goals requires the selection of appropriate strategies, prioritizing of tasks according to importance, and effective managing of one's time. In addition, such success requires the initiation and maintenance of movement

towards the goal, including a relative lack of procrastination and satisfactory handling of potential obstacles. As such, achievement should be fostered by a combination of high assessment and high locomotion. This prediction was tested in two very different contexts, with clear measures of self-regulatory success in participants' important real-life goal pursuits.

In a university setting, locomotion, assessment, and the interaction between locomotion and assessment were used as predictors of student grade point average in a regression analysis (Kruglanski et al., 2000). Students' SAT scores were controlled for in the analysis because they strongly predict college grade point average. Locomotion was a significant predictor of grade point average, but was qualified by a significant interaction between locomotion and assessment. For students who scored below the median on assessment, locomotion was unrelated to grade point average. However, for students who scored above the median on the assessment scale, locomotion was a strong predictor of grade point average. These results suggest that college achievement is due to a combination of both high locomotion and high assessment.

In a military setting, locomotion and assessment scores were used to predict successful completion of an elite combat training unit in the US Army (Kruglanski et al., 2000). The program is highly selective and the training is extremely demanding. The majority of soldiers who attempt the training fail to complete it. Statistical analysis controlled for variables suggested by US Army researchers, including scores from a general technical survey and from a spatial abilities test, whether applicants were commissioned officers or enlisted soldiers, and whether applicants had completed an advanced training course in the Army Rangers. In a logistic regression analysis, high locomotion predicted likelihood of successful completion of the training, but was qualified by an interaction between locomotion and assessment. For soldiers who scored below the median on assessment, locomotion was unrelated to success. However, for soldiers who scored above the median on the assessment scale, locomotion was strongly predictive of success. These results replicate the findings from the university setting regarding the joint determination of achievement by locomotion and assessment, suggesting once again that a combination of high locomotion and high assessment is most conducive to successful goal attainment.

Taken together, the results from these two studies suggest that assessment and locomotion complement one another and that self-regulation is most successful when both modes are active. Even the academic activities, earlier identified by participants as predominantly associated with assessment (Taylor & Higgins, 2002) was better accomplished by those high in both assessment and locomotion.

### *Conclusions: Individual Goal Pursuit*

High assessment generates effort directed towards activities that offer the opportunity to engage in critical thinking whereas high locomotion generates effort directed towards activities that offer the opportunity to advance through tasks. Furthermore,

locomotion and assessment are characterized by different strategies used in judgment and decision making. Throughout the course of goal pursuit, locomotion reflects perpetual motion, resulting in decisiveness in preparation for goal pursuit and a lack of counterfactual thinking and regret following goal pursuit. In contrast, assessment reflects critical and comparative thinking, resulting in a delay of movement until the best alternative can be identified prior to goal pursuit, and prevalent counterfactual thinking and regret following goal pursuit. Similarly, high assessment is associated with vulnerable and unstable self appraisals, whereas high locomotion is associated with optimism and positive appraisals. Moreover, a combination of high locomotion and high assessment was associated with successful self-regulation in two notable contexts.

## Interpersonal Phenomena

Typically, humans pursue their goals in a rich social context wherein other people provide a great deal of information regarding the appropriateness of standards and goals. The tendencies toward assessment and locomotion should be related to individuals' reactions and sensitivity to such information. As we have noted, the assessment tendency is related to sensitivity to standards, and to discrepancies from standards resulting in a negative sense of self. It may be expected, therefore, that assessment would be positively related to sensitivity to socially normative goals, positively associated to sensitivity to social feedback, and negatively related to self-perceptions of emotional intelligence. In contrast, locomotion has been linked to insensitivity to comparative standards, and a generally positive view of the self. Therefore, locomotion should be negatively related to sensitivity to social feedback and positively related to self-perceived emotional intelligence. The pattern of findings regarding assessment and locomotion suggests that more adaptive regulation of emotionally charged social problems will be exhibited by high (vs. low) locomotion, but less adaptive regulation of such problems will be exhibited by high (vs. low) assessment.

### *Perception of the Self in Relation to Others*

The activation of a particular regulatory mode should influence the way in which individuals perceive the self in a social context. Because high (vs. low) assessment should lead to a large number of social comparisons, it should be related to the degree of variability in the judgments reached. In addition, those judgments should be more negative for high versus low assessors, who are unlikely to detect as many self-discrepancies or compare themselves to as many superior performers. Conversely, high (vs. low) locomotion should lead to lower variability in self evaluations, and a general positivity bias due to the focus on movement that is facilitated by such an optimistic outlook. To test these possibilities, Higgins et al. (2002) measured participants'

responses to the regulatory mode questionnaire and the social self-esteem scale (Heatherton & Polivy, 1991). As predicted, high (vs. low) assessment was associated with greater variance in responses and more negative social self-esteem. High (vs. low) locomotion, on the other hand, was associated with less variance in responses, and with more positive social self-esteem.

A congruent hypothesis would state that high (vs. low) assessment should lead to greater variability in perceptions of closeness to important others in their social network, and to generally feel less close to others. By contrast, the locomotion dimension is not expected to bear a systematic relation to variability in perceived closeness or to the feeling of closeness to others. To test these predictions, participants in the Higgins et al. (2002) study completed the Regulatory Mode Questionnaire (Kruglanski et al., 2000) and the Social Network Inventory (Treadwell, Leach, & Stein, 1993), which asks participants to list the names of significant persons that affect their life. Next, each participant rated how close he or she feels to the other person. Finally, each participant was asked to take the perspective of the other person and estimate how close that individual thinks he or she is to the participant. As predicted, there was greater variance in responses by high (vs. low) assessors for both the ratings from the perspective of self and the ratings from the perspective of other. Furthermore, high (vs. low) assessors generally perceived less closeness to their social network members. In contrast to the findings for assessment, locomotion was unrelated to either the variance of closeness ratings or the magnitude of closeness ratings.

### *Normative Social Goals and Social Feedback*

Just as individuals high on assessment orientation critically evaluate the self according to self-standards, they should be sensitive to social criticism, representing the standards of others. On the other hand, individuals high on locomotion orientation perceive the self favorably and should therefore be relatively immune to social criticism. To test this hypothesis, Higgins et al. (2002) had German participants complete the regulatory mode questionnaire and a measure of self-critical and insecure personality (Kuhl & Kazén, 1997). As expected, assessment was positively correlated with sensitivity to social criticism, whereas locomotion was negatively correlated with sensitivity to social criticism (Higgins, et al., 2002). Such a concern with social criticism should lead to anxiety related to such criticism. Consistent with this expectancy, assessment was positively associated with feelings of anxiety in social interactions, whereas locomotion was negatively associated with feelings of anxiety.

Just as individuals with an assessment orientation are concerned with selecting the right or correct goal according to personal standards, they are also concerned with doing what is considered best or right according to others. This concern with social standards should lead to a greater concern for social norms. In a study of participants who had registered for gym classes in Rome, assessment was positively related to behavioral intentions to engage in regular exercise for the next 6 months (Pierro, Mannetti,

Higgins, & Kruglanski, 2002). However, this positive relation was only found when participants also perceived regular exercise as desirable according to social norms. This study also allowed Pierro et al. (2002) to test the extent to which participants achieved this goal by recording participants' actual exercise behavior. Based on the research discussed so far, we would expect that although high assessors are more likely to plan to work out, actual exercise requires an additional high level of locomotion to get the participants moving towards the objective. Consistent with this prediction, the data showed a significant interaction between locomotion and assessment in predicting actual exercising at the gym such that a combination of high assessment and high locomotion led to greatest actual extent of reported exercising at the gym.

The foregoing study illustrates the role that locomotion and assessment play in self-regulation. Assessment, in this case, led to a detection of the discrepancy between the self and the social norm (or comparison point). However, the detection of this discrepancy did not lead to behaviors designed to reduce this discrepancy for all participants. Only participants high on the locomotion orientation as well as high on the assessment orientation actually engaged in behaviors that would reduce the discrepancy between the comparative standard and the self. In a sense then, assessment facilitates the detection of social norms, and locomotion facilitates the adherence to social norms.

### *Emotional Intelligence and Problem Solving*

In the research reviewed so far, assessment, but not locomotion, has been characterized by affective vulnerabilities and emotional instability. Because assessment is related to affective vulnerabilities and a critical view of self, assessment may also be associated with (a) the perception that the self is low in emotional intelligence, and (b) less effective socioemotional problem solving. In contrast, because locomotion is associated with positive self-perceptions, it should be positively related to perceptions of emotional intelligence. Moreover, the concern with moving forward coupled with stable emotions and a lack of extreme negative appraisals should contribute to a positive relation between locomotion and socioemotional problem solving.

Two recent studies by Shalev, Orehek, and Kruglanski (2007) explored these hypotheses. The first study was designed to measure the association between the regulatory modes and the reflective emotional process using the Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). Consistent with the predictions, high (vs. low) assessment was associated with low perceived emotional intelligence, whereas high (vs. low) locomotion was associated with high perceived emotional intelligence.

The findings support the notion that perceived emotional intelligence is associated with activated regulatory modes, and it also stimulates a related question as to whether assessment and locomotion are associated with actual effectiveness of socioemotional processing. To address this question, Shalev et al. (2007) measured the

association between regulatory mode and social problem solving. Social problem solving requires the successful construction of means–end strategies appropriate to the problem at hand. This includes the ability to generate possible solutions, and the construction of step-by-step processes necessary to perform the adopted solutions. The latter processes include a consideration of the motivations of both the self and others and the identification of potential obstacles. This requires awareness and sensitivity to potential interpersonal problems (socioemotional skills) and consideration of the effects of one's behavior on oneself and others (Platt & Spivack, 1975).

To assess this ability, Shalev et al. (2007) used an adapted version of the Means–Ends Problem Solving Procedure (MEPS; Platt & Spivack, 1975). Participants were provided with a description of a problem situation that ends with a successful resolution. Their task was to provide the necessary means for reaching such a resolution. Specifically, participants were presented with four problems: (a) you realize that a friend is avoiding you, (b) your dating partner tells you that he or she is very angry with you, (c) your professor writes you that you may fail a class, and (d) you realize that the suggestions of a committee of which you are a member will not work. To score the ratings of problem solving effectiveness, researchers initially presented each of the four situations to five independent judges and instructed them to list the steps or solutions involved in what they believed to be a "model" response to each situation. The responses were compiled to form a list of model solutions and a list of counterproductive solutions. There was a high degree of consensus among the judges regarding the steps that should be included in each of these indexes. For example, the model solutions for the situation involving a close friend included (a) seeking a personal meeting with the friend, (b) approaching the issue in a tactful way, and (c) making comments aimed to reaffirm the friendship. Examples of solutions that were considered counterproductive were (a) avoiding the friend, (b) acting toward the friend in a mean or insensitive manner, and (c) blaming or criticizing the friend when discussing the issue.

Each student's responses to the four situations were rated along a global dimension of problem solving effectiveness on 7-point Likert scales with response alternatives ranging from *not at all effective* (1) to *extremely effective* (7). When making this rating, raters were instructed to consider the entire set of solutions or strategies offered by students in each particular response. Consistent with previous findings, high (vs. low) assessment was associated with a greater number of potential means generated. However, high (vs. low) assessment was related to low social problem solving ability, whereas high (vs. low) locomotion was associated with high social problem solving ability.

Taken together, these findings suggest that high, as opposed to low, assessment is associated with low perceived emotional intelligence and negatively related to the ability to successfully regulate emotions in relationships. Because assessment is associated with a critical view of the self and others, it may hinder adaptive emotional responses. For example, in the current scenarios, even though assessment may have led to a greater sensitivity to the problem it also involved a critical evaluation of the other, preventing the person from generating effective strategies for moving forward toward resolving

the interpersonal dilemma. In contrast, high, as opposed to low, locomotion appears to be associated with high perceived emotional intelligence as well as the ability to regulate social and emotional problems. Though the foregoing findings are consistent with regulatory mode theory, their specific underlying mechanisms require further empirical probing for their elaboration. This represents a task for future research.

### *Conclusions: Interpersonal Phenomena*

The assessment mode is associated with greater criticism of the self and others in interpersonal contexts, leading to more negative and less stable perceptions of the self in relation to others. In addition, assessment is associated with greater sensitivity to information in the social environment, leading to an increased likelihood of adopting social norms and being influenced by social feedback. This vulnerability and instability is consistent with the finding that high assessment is associated with low perceived emotional intelligence and poor socioemotional regulation. In contrast, locomotion is related to favorable and stable perceptions of the self in relation to others. In addition, locomotion is associated with lesser sensitivity to information in the social environment, leading to decreased attention to social norms and relative insensitivity to social feedback. Consistent with these findings, locomotion is positively related to perceptions of emotional intelligence and successful socioemotional regulation.

## Organizational Phenomena

Many organizations provide external reward structures to motivate individuals, which should be attractive to high assessors because of their concern with social feedback. On the other hand, high locomotion should lead to a perception of work as a reward independent of external compensation because it is viewed as an end in itself. Just as locomotion and assessment are associated with preferred decision-making strategies, they should relate to preferences for different styles of leadership, with assessors preferring those that allow for much critical thought on the part of employees, and locomotors preferring those that allow for swift and efficient movement through objectives. Locomotion should also be positively associated with positive attitudes and outcomes regarding organizational change. Such change should foster significant movement, allowing high locomotors to thrive.

### *Intrinsic and Extrinsic Task Motivation*

Organizational contexts present the possibility for both intrinsic as well as extrinsic task motivation. The individual may be internally motivated by the potential for

movement towards objectives, or may be extrinsically motivated by the rewards and/or punishments that come with varying levels of success. Based on regulatory mode theory, we would expect that locomotion would be positively related to intrinsic task motivation because high locomotion is characterized by a propensity to remain in motion and promotes an increased level of experiential involvement in various tasks (e.g., Csikszentmihalyi, 1975). leading goal-related behavior to be rewarding as an end in itself. In contrast, high assessment is associated with social comparison and sensitivity to social feedback, which should lead to a positive relation between assessment and extrinsic task motivation.

Pierro, Kruglanski, and Higgins (2006a) tested this expectation in four Italian organizations, including the Postal Service, Italian Army, and Multinational Electric-Energy Company. Data from employees in these organizations confirmed the hypotheses, as locomotion was positively related to intrinsic motivation whereas assessment was positively related to extrinsic motivation. In addition, these relations were found even when other personality inventories (e.g., the Big Five) were controlled for, suggesting that these two regulatory modes explain something beyond more general personality constructs. To test this finding in a laboratory setting, Study 2 manipulated external reward (payment for participation vs. no payment) using a college student sample. Consistent with Study 1, high (vs. low) locomotors reported being more interested and involved in a puzzle task, irrespective of the presence of an external reward. However, high (vs. low) assessors reported greater interest and involvement in the puzzle task when an external reward was present than when no such reward was present.

These data suggest further that locomotion is positively related to investment and interest in goal pursuits without regard for goal value, whereas assessment is positively related to investment and interest in goal pursuits to the extent that the goal is deemed valuable. A third study further elaborated the relation between locomotion, task involvement, and intrinsic motivation. Using a sample of employees at an Italian insurance agency, Pierro et al. (2006a) found that intrinsic motivation partially mediated the relation between locomotion and effort commitment. This suggests a potential causal chain such that locomotion leads to greater intrinsic motivation, which in turn leads to greater commitment of effort to the goal. Although effort investment may generally increase goal-relevant behaviors, this effort is likely to go to waste if not mitigated by assessment of goal progress throughout the course of activity. Consistent with this prediction, a fourth study of employees of a computer company replicated the mediational chain found in Study 3, and additionally found that goal attainment was predicted by an interaction between locomotion and assessment such that individuals high on both modes were most likely to attain their goals.

To further test the relation between locomotion and effort investment in organizations, Pierro, Kruglanski, & Higgins (2006b) tested the relation among firemen, bank clerks, and employees in the Ministry of Education, in Rome. In all three samples, there was a strong positive relation between individual differences in locomotion and self-reported work effort investment. However, effort should only be exerted to the extent that locomotion increases involvement in the work. Supporting this prediction,

Pierro et al. (2006b) found with a sample of registered nurses in a Rome hospital that job involvement partially mediated the relation between locomotion and effort investment. A fourth study, completed by employees at an insurance agency in Rome, replicated the results of Studies 2 and 3.

### *Leadership Styles*

Kruglanski, Pierro, & Higgins (2007) investigated the link between regulatory mode and preference for advisory and forceful leadership styles. An advisory leadership style involves counseling, consultation, and participation, including providing guidance and advice. Typically, options and alternatives are discussed and compared according to potential standards. Hence assessment should be positively related to preferences for style of leadership, whereas locomotion should not. In contrast, a forceful leadership style is demanding, directive, and coercive. Through this leadership style, disruptions are minimized, and subordinates are encouraged to move forward. Thus locomotion should be positively related to preferences for a forceful leadership style, whereas assessment should not. In a study of bank clerks, these expectations were confirmed, as assessment (but not locomotion) was positively related to preferences for advisory leadership, and locomotion (but not assessment) was positively related to preferences for forceful leadership. A second study, with a sample of firefighters, replicated this pattern of findings.

Closely related to advisory and forceful leadership styles are participative and directive leadership styles. Participative leaders encourage subordinates to share in the decision-making process, facilitating the evaluation of alternatives on the part of subordinates. The evaluation of alternatives comes at the expense of quick movement. Hence assessment should be positively related to preference for a participative leadership style, while locomotion should not.

Directive leaders issue subordinates explicit instructions about tasks, including what is to be done, how to do it, and when to do it, facilitating movement. This rapid movement comes at the expense of critical thinking on the part of the subordinate. Hence locomotion should be positively related to preference for a directive leadership style, whereas assessment should not. Confirming these predictions, assessment (but not locomotion) was positively related to preference for participative leadership, whereas locomotion (but not assessment) was positively related to preference for directive leadership. Overall, assessors seem to prefer leaders who allow for maximum involvement in evaluation of alternatives, whereas locomotors prefer leaders who afford efficient movement toward goals.

### *Organizational Change*

Change promises dynamic movement from state to state that should be appealing to locomotors. As the essential locomotion motivation consists of the propensity to remain

in motion, the selection of new goals, and the confrontation of new experiences, locomotion-oriented individuals should be particularly attracted to organizational change. It follows that in organizational contexts individuals high (vs. low) on the locomotion dimension should have a more positive experience during episodic change and demonstrate superior coping with challenges that change brings about. Data regarding assessment levels was not collected in these studies.

To test this hypothesis, Kruglanski, Pierro, Higgins, and Capozza (2007) studied nurses in a hospital in Rome, who had been subjected to several role changes related to new rules regarding their profession. The new regulations altered the nurse's role by drastically changing it from the way the nursing profession had practiced previously, confronting its members with considerable threats and challenges. The results from this study confirmed the hypothesis, as locomotion was positively related to self-reported (successful) coping with change. A second study was conducted at a postal service center in central Italy which had been subjected to far-reaching changes including a revamping of the computer system and organizational shifts that considerably modified old habits and conventions of postal workers. Replicating the results from the first study, locomotion was positively related to successful coping with change. In a third study, employees in Rome who had undergone far-reaching reforms having to do with integration of various sectors and a reorganization of incentive systems, completed measures of locomotion, coping with change, and support for innovation within the organization. Locomotion was again positively related to coping with change. Importantly, the link between locomotion and coping was unaffected by the support for innovation within the organization. This was expected because locomotion should be related to movement, regardless of social norms and evaluative concerns.

The correlational nature of the first three studies leaves open the direction of causality. To improve on this limitation, the fourth study utilized a longitudinal design in which locomotion was measured a month prior to the other constructs. Data was collected from National Postal workers from three different geographical areas of Italy who went to a newly established institute for professional retraining. Among the various changes instituted, employees were requested to participate in a job mobility initiative whereby they underwent a period of retraining lasting one month. In the first session, locomotion, expectations about organizational change, job satisfaction, and commitment to the organization were measured. In the second session, the same organizational commitment and job satisfaction were completed again, as well as a coping with change measure.

Because locomotion is positively related to optimism and an orientation towards movement, it should lead to favorable expectations of change. Supporting this prediction, locomotion was positively related to favorable expectations of change. Replicating the findings from the earlier studies, locomotion was positively related to successful coping with organizational change. Consistent with these findings, locomotion was positively related to the time 2 measures of organizational commitment and job satisfaction. Moreover, coping with change mediated the relationship

between (a) locomotion and coping with change, and (b) locomotion and organizational commitment. This suggests that the experience (or perception) of successful coping induces positivity toward the new job whereas the experience of relatively unsuccessful coping reduces the amount of the positivity.

### *Conclusions: Organizational Phenomena*

Consistent with finding in the interpersonal realm that assessment is associated with greater sensitivity to social feedback, data from the organizational context demonstrates a positive relation between assessment and motivation according to external rewards. Consistent with findings in the individual realm that assessment is associated with a preference for decision-making strategies that allow for numerous comparisons, assessment is positively related to a preference for advisory leadership styles. In contrast, locomotion is associated with lesser sensitivity to social feedback and greater concern with movement as an end in itself, demonstrated in the organizational context in the positive relation to intrinsic task motivation. The focus on activity flow and decision making that fosters it found with respect to individual goal pursuits is consistent with the positive relation here between locomotion and a preference for directive leadership styles.

## Cultural Phenomena

Regulatory mode can be examined across cultures in two ways. First, cultures may vary in the relative levels of locomotion and assessment. Given that differences in the relative strength of each regulatory mode may vary across cultures, it is of interest to investigate whether the functioning of the regulatory modes within these nations also differs or whether such functioning is basically the same across cultures. Higgins, Pierro, and Kruglanski (2007) recently conducted a cross-cultural study to investigate both of these possibilities, including college student participants from England, India, Korea, Israel, Italy, Japan, Poland, Spain, and the United States.

The first type of analysis concerned the relative strength of locomotion and assessment tendencies in each culture. To test for this, Higgins et al. (2007) performed two statistical tests. First, they computed a score of regulatory mode predominance by subtracting each participant's assessment score from their locomotion score. In a second analysis, they performed a within-subjects repeated measure analysis, comparing each participant's locomotion and assessment scores. Across the two statistical tests, there was a clear picture of the relative operation of the two modes in each culture. Three cultures appear to be relatively pure locomotors. Italy, Spain, and India are each relatively high in locomotion and relatively low in assessment. Two cultures appear to be relatively pure assessors. Japan and Korea are relatively high in assessment and

relatively low in locomotion. The United States and Israel were relatively high in both locomotion and assessment, with no predominance between the two modes. England and Poland were relatively moderate in both locomotion and assessment, with no predominance of either locomotion or assessment.

The second analysis tested for relations between the two regulatory modes and other variables. It was expected that there would be great similarity in the strength and direction of these linkages across cultures. The cultures in which this data was obtained include India, Israel, Italy, Japan, and the United States. In the first analysis, predominant locomotion individuals were compared to predominant assessment individuals in their level of self-esteem and Big Five characteristics. In the second analysis, the partial correlations between locomotion (controlling for assessment) and each of the personality characteristics, and the partial correlations between assessment (controlling for locomotion) were computed for each of the personality characteristics.

High locomotion is associated with less critical self-evaluation and greater optimism about the future. High locomotion individuals use this confidence about the future as a strategy that allows them to continually move forward. In contrast, individuals high on assessment are oriented towards critical evaluation of themselves. Thus self-esteem should be higher for predominant locomotors than predominant assessors. Consistent with this, self-esteem scores of predominant locomotors were higher than self-esteem scores of predominant assessors in every nation studied (India, Israel, Italy, Japan, and the United States). In addition, there was a positive (partial) correlation between locomotion and self-esteem in every nation studied. In contrast, the (partial) correlation between assessment and self-esteem was negative in every country (but was significant in Israel, Japan, and the United States).

Extraversion reflects sociability, eagerness to meet new people, and being enthusiastic and carefree. These behaviors would strategically support moving ahead without hesitation or care. Thus extraversion should be higher for predominant locomotion than predominant assessment individuals. Consistent with this, in Israel, Italy, Japan, and the United States, the extraversion scores of predominant locomotion individuals were higher than the extraversion scores of predominant assessment individuals. The results for India were also in the same direction, but were not significant. In addition, there was a significant positive (partial) correlation between locomotion and extraversion in every nation studied. In contrast, the (partial) correlation between assessment and extraversion was negative in every country and was significantly negative in United States.

Conscientiousness refers to individuals who are practical, organized, thorough, planful, efficient, and responsible. Being organized, planful, practical, and efficient allows the goal pursuit process to flow smoothly. Thus conscientiousness would be a strategy for predominant locomotion individuals. Predominant assessment individuals may be associated with some aspects of conscientiousness, but not others. Assessors' tendency for critical evaluation could disrupt efficiency and practicality while contributing to thoroughness. Thus it is possible that conscientiousness would be higher for predominant locomotion than predominant assessment individuals. In all cultures

studied, the conscientiousness scores of predominant locomotion individuals were significantly higher than the conscientiousness scores of predominant assessment individuals. In addition, there was a positive (partial) correlation between locomotion and conscientiousness in every nation studied. In contrast, the (partial) correlation between assessment and conscientiousness was generally negative in every country and was significantly negative in Israel.

Agreeableness reflects the tendency to be sympathetic, appreciative, warm, trusting, and forgiving rather than fault-finding. Because high assessment individuals critically evaluate the self and others, they are likely to be more fault-finding than sympathetic and appreciative. On the other hand, the tendency of high locomotion individuals to forego critical evaluation and, instead, just move on to the next project should make them engage in less fault-finding and to be more forgiving. Consistent with this expectation, in all cultures studied, the agreeableness scores of predominant locomotion individuals were significantly higher than the agreeableness scores of predominant assessment individuals. In addition, there was a positive (partial) correlation between locomotion and agreeableness in every nation studied, and was significant in every nation except Israel. In contrast, the (partial) correlation between assessment and agreeableness was significantly negative in every nation except India.

Openness reflects the tendency to be imaginative, original, curious, intellectual, and to have a wide range of interests. Openness as a strategy should be useful for both locomotion and assessment. Having a wide range of interests and high curiosity would facilitate engagement in many activities and provide ample opportunities for movement, which would fit the orientation of high locomotion individuals. On the other hand, imagination and curiosity also provides opportunities for making comparisons and evaluations, which would fit the orientation of high assessment individuals. Therefore, there should be a positive relation between each regulatory mode and openness, without a difference between predominant assessment and predominant locomotion modes. Indeed, in all cultures studied, the openness scores were moderately high for both predominant locomotion and predominant assessment individuals, producing no significant differences. In addition, there was a positive (partial) correlation between locomotion and openness in every nation studied, and the (partial) correlations were significant in every nation except Israel. In India, Japan, and the United States, there was also a significantly positive (partial) correlation between assessment and openness.

Neuroticism reflects the tendency to be emotionally unstable, moody, worried, tense, anxious, nervous, and self-punishing. Because of the critical nature of assessment, and the orientation towards an optimistic future for locomotion, neuroticism should be higher for predominant assessment than predominant locomotion individuals. Consistent with this, in all cultures studied the neuroticism scores of predominant assessment individuals were significantly higher than the neuroticism scores of predominant locomotion individuals (with India and Italy being marginally significant). In addition, there was a significant positive (partial) correlation between assessment and neuroticism in every nation studied. In contrast, the (partial) correlation between

assessment and neuroticism was negative in every country and was significantly negative in Israel.

### *Conclusions: Culture*

The relative operation of locomotion and assessment varies across cultures, but each is related to other variables in a consistent manner across cultures. Assessment is positively related to openness and neuroticism, and negatively related to self-esteem, extraversion, conscientiousness, and agreeableness. In contrast, locomotion was positively related to self-esteem, extraversion, conscientiousness, agreeableness, and openness, but negatively related to neuroticism. These relations support the notion that regulatory modes reflect the level of self-regulatory systems within a general personality architecture, served by more general personality traits as strategic channels.

## General Conclusions

Regulatory mode theory conceptualizes assessment and locomotion as independent of one another, such that each is considered a relatively stable individual difference variable but also significantly influenced by situational forces. Moreover, each of the modes have been categorized as self-regulatory systems within a general personality architecture, with more general personality traits serving as strategic channels of goal pursuit. Consistent with the conceptualization of assessment and locomotion as distinct self-regulatory modes, many cultures demonstrated a predominant orientation towards one mode over the other. For example, Italy, Spain, and India are each high in locomotion and low in assessment. Japan and Korea are high in assessment and low in locomotion.

Consistent with the conceptualization of regulatory modes as relatively stable individual difference variables, the assessment and locomotion scales repeatedly predicted other constructs, including cases in which regulatory mode was measured long before other variables. In addition, the conceptualization of the two modes as influenced by environmental or situational forces was supported by the success of laboratory manipulations and variation in the relative strength of the two modes across cultures. The conceptualization of the regulatory modes as self-regulatory systems within a general personality architecture was supported by the consistent relation between the two modes and personality variables as strategic channels across cultures and the success of the two modes in predicting outcome variables even when the Big Five personality variables were controlled for, suggesting that they account for something beyond the more general traits.

In summary, assessment reflects energy invested in activities that afford critical thought and evaluation according to comparative standards. This preoccupation with comparison

according to standards manifests as greater detection of self-discrepancies at the individual level, increased social comparison in interpersonal contexts, and a preference for extrinsic rewards in organizations. This heightened sensitivity to internal and external standards results in a vulnerability to negative appraisals and instability of self-perceptions. Assessment is also associated with a preference for decision making according to as many comparisons as possible, including a preference for leadership that will allow subordinates to participate in the evaluative process. Effort is invested in a complete analysis of all information even if this cognitive activity requires a stalling of movement towards goals. Prior to goal pursuit, assessment is positively related to sensitivity to social standards, increasing the adoption of socially normative goals. Following goal pursuit, assessment is positively related to counterfactual thinking and regret due to the heightened sensitivity to feedback. Consistent with these specific effects, assessment has been positively related to openness and neuroticism, and negatively related to perceived emotional intelligence, self-esteem, conscientiousness, agreeableness, and extraversion.

In contrast, locomotion reflects energy invested in activities that afford perpetual activity away from current states and toward desired states. This preoccupation with forward movement manifests as a penchant for activity flow, including decision-making strategies that allow for immediate progress and a preference for leadership that encourages action rather than evaluation. Because of the desire for movement, locomotion is positively related to intrinsic task motivation and successful coping with organizational change. Following goal pursuit, locomotion is negatively related to sensitivity to social feedback, counterfactual thinking, and regret, as each would disrupt the flow of activity. Consistent with these specific effects, locomotion has been positively related to perceived emotional intelligence, self-esteem, openness, conscientiousness, agreeableness, and extraversion, but negatively related to neuroticism.

These findings highlight the trade-offs involved with respect to each regulatory mode. High assessors are oriented to compare themselves to standards, which means they will compare themselves to high standards as well as to low standards. Generally, this self-evaluative style has the potential cost of increasing failure experiences from self-comparisons to high standards, and increased emotional instability from comparing oneself to both high and low standards. The value in this for assessors includes the willingness to consider alternative possibilities. In addition, high assessors might be more realistic and more accurate in their self-evaluations and might be able to utilize this information in attempts towards self-improvement.

Locomotion instigates high activity flow concerns that produce greater decisiveness, attentional control, vitality, conscientiousness, and openness to change, as well as activity engagement with higher intrinsic involvement, effort investment, behavioral activation, maintenance, and involvement. Once again, all self-regulatory orientations have trade-offs. Because locomotion is concerned with change per se, it is possible for resources to be committed to the pursuit of a goal that is not worth the resources allocated to it.

Although assessment and locomotion have different (and often opposing) effects on self-regulation, and each mode involves a trade-off, the two modes can operate as

complements to one another, with the most successful self-regulation generally occurring when both modes are active. Indeed, a combination of high assessment and high locomotion led to greater self-regulation in academic, military, and fitness contexts. Note that even though academic activities are generally perceived to reflect assessment, and fitness activities are generally perceived to reflect locomotion, the successful attainment of each of these pursuits required the activation of the alternative mode. Therefore, the opposing influence of each mode can balance the other such that the two modes are complementary.

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# 18

# *The Costly Pursuit of Self-Esteem*

## Implications for Self-Regulation

**Jennifer Crocker, Scott Moeller, and Aleah Burson**

Most people want to believe that they have worth and value as human beings, that they have desirable qualities, and that other people concur in this assessment (e.g., Dunning, Heath, & Suls, 2005; Leary & Baumeister, 2000). Psychologists have suggested that humans have a fundamental need to pursue self-esteem and construct desirable self-views (e.g., Baumeister, Heatherton, & Tice, 1993; Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004; Taylor & Brown, 1988). The specific qualities that people associate with being worthy and valuable differ across individuals, contexts, and cultures; for example, confidence and superiority are more desirable in the US, whereas modesty and fitting in are more desirable in Japan (see Heine, Lehman, Markus, & Kitayama, 1999, for a review). But nearly everyone wants to believe they have worth and value because they have desirable qualities, and that others recognize and acknowledge those qualities (Sedikides, Gaertner, & Toguchi, 2003). We call this *egosystem motivation.*

In this chapter, we consider the implications of this motivation for self-regulation. We argue that concern about being a person of worth and value and constructing desired private and public self-images activates the "hot" emotional system (Metcalfe & Mischel, 1999), and undermines the pursuit of other long-term goals. That is, when people simultaneously try to achieve long-term goals and try to regulate their self-esteem and the impressions others form of them, self-regulation to achieve important long-term goals will suffer. We review research showing how investing self-esteem in a particular domain such as academics, and the related goal to get others to recognize and acknowledge one's desired qualities, undermine self-regulation. Overall, we suggest that pursuing self-esteem and constructing desired self-images undermine self-regulation of long-term goals when it matters most: when people must do things that are difficult, uncomfortable, or threatening to their ego to succeed at their most

cherished goals. We propose that ecosystem motivation, and specifically concerns about having compassion and supporting others, energizes self-regulation through a "warm" system, which is emotional but not ego-involved. Because research on ecosystem motivation and self-regulation through the warm system is quite new, there is as yet less empirical evidence examining it. Nonetheless, we describe initial evidence that self-regulation through the warm system facilitates self-regulation.

## Egosystem Motivation

The goal to construct desired images of the self in the eyes of the self and others motivates a great deal of human behavior; people strive to meet both their own and others' standards of worth and value (e.g., Higgins, 1987; Leary & Baumeister, 2000; Pyszczynski et al., 2004). Constructing desired self-images helps people satisfy their needs. Other people form impressions of the self almost instantaneously on very limited information (Ambady, Bernieri, & Richeson, 2000); those impressions can affect a wide range of judgments and outcomes, such as gaining acceptance and inclusion into groups and relationships and achieving prestige, resources, or status within those groups (Leary, 1995, 2007). Thus it behooves people to manage the impressions others form of them. Typically, people do not intend to deceive others, but rather intend to convey an accurate but idealized or best possible conception of the self (e.g., Baumeister, 1982; Leary, 1995; Schlenker, 1980).

How people view themselves and how others view them are inextricably linked (Cooley, 1902/1956; Leary & Downs, 1995; Tetlock & Manstead, 1985). Through experience, people draw conclusions about what they need to be, do, or have as a person to get others to accept, include, admire, love, or respect them and thereby gain safety, status, prestige, or resources (Rogers, 1961). Over time, those qualities may be internalized as *contingencies of self-worth*—beliefs about the domains in which people feel they must succeed to have value and worth as a person (Crocker & Wolfe, 2001). Thus egosystem motivation involves both public and private self-images. People not only want others to see them as having desirable qualities; they also want to see themselves as having those desired qualities (Leary, 2007). Constructing, inflating, maintaining, and defending public and private self-images becomes a means by which people try to satisfy their needs and desires. Consequently, perceived threats to the self-image feel like threats to the well-being or even survival of the self and activate the fight-or-flight self-preservation physiological system, elevating cortisol (Dickerson & Kemeny, 2004).

Egosystem motivation is fundamentally evaluative; in this framework, people evaluate and judge themselves, and they expect evaluation and judgment from others. They focus on proving themselves and demonstrating their desired qualities, and validating their worth in their own eyes and the eyes of others. In this framework, people are concerned about others only insofar as others give or withhold something from the

self such as approval, inclusion, or validation (Leary & Baumeister, 2000), or the self gains or loses from association or comparison with others (Tesser, 1988).

Egosystem motivation is both a state and a trait; that is, everyone has an egosystem motivational framework at times, but some people are chronically high in egosystem motivation whereas others are chronically low. Contingencies of self-worth represent the private side of chronic egosystem motivation; they reflect people's private beliefs about what they must be or do to have value and worth as a person. Self-image goals represent the public side of egosystem motivation; they reflect the desire to get other people to recognize and acknowledge one's desired images.

## Implications for Self-Regulation

Self-regulation and self-control have demonstrated long-term benefits (Mischel & Shoda, 1995; Shoda, Mischel, & Peake, 1990). Self-regulation involves restraining impulses to engage in behaviors that have known costs to the self despite the short-term gratification they provide (e.g., smoking, binge eating, or breaking laws), as well as pursuing goals that have future benefits (Baumeister & Vohs, 2003). Achieving long-term goals requires the seemingly contradictory qualities of persistence and effort in the face of setbacks, and the ability to recognize when one course of action is fruitless and substitute another strategy to achieve the desired result. Thus self-regulation involves sustaining focus on important goals, taking action to reduce discrepancies between one's current state and a desired state or goal, and attending to feedback about whether those actions lead to progress toward the goal (Carver & Scheier, 1998). Egosystem motivation may undermine all of these aspects of self-regulation.

Metcalfe and Mischel (1999) proposed that self-control and self-regulation involve two systems: a cool, cognitive system which "allows a person to keep goals in mind while pursuing them and monitoring progress along the route" (p. 5), and a hot, emotional system that is fast, simple, reflexive, accentuated by stress, and under stimulus control. To be sure, self-regulation in the hot system also involves cognitive processes such as interpretation of events, causal attributions, and social judgments; hot system self-regulation is not completely devoid of cognition. However, cognition in the hot system tends to be simpler and more reflexive than cognition in the cool system (Metcalfe & Mischel, 1999).

Because self-esteem and desired and dreaded self-images are linked to strong emotions, the pursuit of self-esteem is largely under the control of the "hot" system. People who chronically have egosystem motivation should experience more intense, self-relevant (i.e., hotter) emotions and have more difficulty keeping their long-term goals in mind. Following setbacks, they may indulge immediate impulses to make themselves feel better, giving short-term emotion regulation priority over other self-regulatory goals (Tesser, 1988; Tice & Bratslavsky, 2000; Tice, Bratslavsky, & Baumeister, 2001). In other words, egosystem motivation can create conflicts between self-regulation to achieve self-esteem or reduce negative affect in the short term, and self-regulation to achieve

long-term goals that may involve threats to self-esteem. These conflicts can undermine self-regulation toward important long-term goals either because people give priority to the immediate goal of boosting or protecting self-esteem, or because simultaneously juggling two conflicting goals results in subobtimal self-regulation for both goals.

When people pursue self-esteem, they are motivated to construct desired self-images. As a result, they have difficulty realistically appraising their current state and comparing it to their ideal state. A great deal of research suggests that people find it difficult to appraise their strengths and weaknesses accurately (see Dunning et al., 2005, for a review); this difficulty stems, at least in part, from egosystem motivation to view the self in a positive light (e.g., Kunda & Sanitioso, 1989). For example, people typically respond defensively to information about the health risks of their behaviors, such as smoking (see Sherman & Cohen, 2006, for a review); a boost to self-esteem from irrelevant positive feedback can reduce this defensiveness (Trope & Pomerantz, 1998).

People often have difficulty disengaging from goals that are connected to their self-worth, persisting fruitlessly on unsolvable tasks. Effective self-regulation requires careful consideration of when to disengage from goals; persistence generally pays off, but persistence at unattainable goals can result in repeated failure experiences with negative consequences for mental and physical health (Carver & Scheier, 1998; G. E. Miller & Wrosch, 2007; Wrosch, Miller, Scheier, & de Pontet, 2007). On the other hand, people devalue tasks they are not good at (Tesser, 1988), which enables them to disengage from goals when they receive negative feedback or social comparison information. Self-regulation in the hot system may impair judgments about when to persist and when to quit (Baumeister et al., 1993; Pyszczynski & Greenberg, 1987).

Egosystem motivation may also deplete self-regulatory resources. For example, overriding familiar or dispositional tendencies in the service of impression management undermines subsequent self-regulation (Vohs, Baumeister, & Ciarocco, 2005). When people feel they must succeed to have worth and value, they may devote so much self-regulatory energy to the task that they have insufficient self-regulatory resources for subsequent tasks. For example, Vohs and Heatherton (2000) showed that when chronic dieters, who typically base their self-esteem on appearance, exerted self-control by not eating a good-tasting snack food, they were subsequently less able to exert self-control on a task that required inhibiting emotional expression; nondieters did not show this depletion of self-regulatory ability. Successful self-regulation consumes self-regulatory resources for various reasons, including the effort required to overcome "hot" system responses by regulating emotion (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Consequently, egosystem motivation should be associated with poor self-regulation.

## Contingencies of Self-Worth and Self-Regulation

Self-esteem fluctuates when people succeed or fail in domains in which their self-esteem is contingent (Crocker, Sommers, & Luhtanen, 2002; Niiya & Crocker, 2007b). For

example, the more people stake their self-esteem on academics, the more their self-esteem increases when they experience academic success, and the more it decreases when they fail (Crocker et al., 2002). The more students base their self-esteem on others' approval, the more their self-esteem drops following rejection by a same-sex peer (Park & Crocker, 2008). When self-esteem is contingent, people feel particularly good about themselves and experience stronger positive emotions following success because it validates that they possess the qualities on which their self-esteem is staked, and therefore that they are valuable and worthy human beings. On the other hand, people feel particularly bad about themselves following failure in contingent domains because failure indicates that they lack those qualities and are worthless; these drops in self-esteem are associated with negative emotion and can be particularly painful (e.g., Crocker et al., 2002; Park & Crocker, 2008), consistent with the idea that in domains of contingent self-worth, self-regulation operates in the hot system.

In sum, the more contingent self-esteem is on succeeding in a domain, the more the "hot" system is activated.

### *Benefits of Contingent Self-Worth for Self-Regulation*

People want to succeed in domains of contingent self-worth so they can experience high self-esteem and positive emotions, and avoid failure, so they do not experience low self-esteem or painful self-relevant emotions. Thus contingent self-worth can energize goal pursuit, motivating people to invest effort to accomplish their goals in domains of contingent self-worth.

Evidence that contingencies of self-worth enhance motivation comes from a longitudinal study of more than 600 college freshmen (Goals and Adjustment to College Study; Crocker, Luhtanen, Cooper, & Bouvrette, 2003). Prior to the start of their freshman year in college, students completed a measure of common contingencies of self-worth. Then, at the end of the first and second semesters in college, they were asked how often they engaged in various activities, and how much time per week they spent on those activities. Contingencies of self-worth prior to college predicted first and second semester activities. For example, basing self-esteem on appearance predicted how much time students spent grooming, shopping, partying, and socializing in their first semester; basing self-esteem on academics predicted how much time they spent studying; basing self-esteem on virtue predicted spending time on volunteer activities; and basing self-esteem on religious faith (God's love) predicted how much time they spent in spiritual activities such as praying, attending religious services, and so forth.

Although these findings are consistent with the hypothesis that contingencies of self-worth enhance motivation and facilitate self-regulation, they are limited by the self-report nature of the data; it was not possible in this study to verify that these self-reports were accurate. Subsequent laboratory experiments, in which behavior is directly observable, confirm that contingencies of self-worth facilitate self-regulation.

For example, Strahan (2002) measured appearance contingency of self-worth and found that highly contingent women ate less snack food. Brook (2005, Study 1) measured academic contingency of self-worth, had participants solve Graduate Record Examination (GRE) analytical problems, and then gave participants the opportunity to study solutions to the problems they had attempted. Basing self-worth on academics marginally predicted spending more time studying the GRE solutions. In sum, both survey and laboratory data show that contingencies of self-worth are associated with self-regulation; highly contingent people invest more time and effort in domains in which their self-esteem is contingent.

### *Costs of Contingent Self-Worth for Self-Regulation*

Although contingencies of self-worth can energize goal pursuit, they alter the quality of motivation in ways that may ultimately be self-defeating, decreasing the chances of achieving important goals (Baumeister & Scher, 1988). Because drops in self-esteem are emotionally painful, in domains of contingent self-worth people often pursue goals with an eye on the implications of success and failure for self-esteem. They focus on what their performance means for their value and worth as a person. Thus contingent self-worth adversely affects self-regulation through the nature, quality, and stability of goals.

People with contingent self-esteem often prioritize protecting self-esteem even if doing so interferes with achieving their goals (Baumeister, 1997). For example, students who receive lower than expected grades may protect self-esteem by disparaging the exam or the instructor, deciding the course is not interesting or important, or they may even disengage from their major or disengage from school entirely (Schmader, Major, Eccleston, & McCoy, 2001). People who disengage or dismiss feedback to protect self-esteem miss opportunities to learn and broaden their understanding. Ultimately, the failure to persist at goals and learn from difficulty or feedback interferes with accomplishing important goals.

*Self-handicapping.* When they are uncertain that they can succeed on a task, people sometimes do things that simultaneously decrease the probability of success and provide a plausible excuse for failure that does not indicate lack of ability. For example, reduced effort, practice, or persistence (e.g., Tice & Baumeister, 1990), procrastination (e.g., Ferrari & Tice, 2000), drinking alcohol before important meetings (e.g., Jones & Berglas, 1978), and listening to distracting music while studying or performing a difficult task (e.g., Rhodewalt & Davison, 1986) all provide compelling explanations for potential failure without undermining perceptions of one's fundamental competence. People who self-handicap can believe in their competence even after failure. The self-protection that self-handicapping affords comes at a high cost, however, because it increases the probability of failure.

Niiya, Brook, and Crocker (2007) examined the effects of contingent self-worth in conjunction with entity versus incremental theories of intelligence on self-handicapping.

Incremental theorists believe that intelligence is malleable whereas entity theorists believe that intelligence is fixed and innate (Dweck, Chiu, & Hong, 1995; Dweck & Leggett, 1988). Dweck (2000) argued that incremental theorists who try their best and fail should feel good about themselves for striving wholeheartedly and using their abilities to the fullest. In this view, incremental theorists do not need to self-handicap on challenging tasks because protecting self-esteem from failure is not their concern (Dweck, 2000). Consistent with this view, Rhodewalt (1994) and Ommundsen (2001) found significant associations between entity theory (or low incremental theory) and self-reported self-handicapping.

In contrast, Niiya et al. (2007) hypothesized that students who base their self-esteem on academics would be more likely to self-handicap, but only if they held incremental theories of intelligence. They reasoned that for contingent incremental theorists, failure following investment of effort or performance under optimal conditions is especially threatening, because incremental theorists believe they should do better with effort or under better performance conditions. If they invest effort or perform under optimal conditions and fail nonetheless, their self-esteem may be especially vulnerable, because failure following high effort suggests a lack of ability (Covington, 1984). Entity theorists, however, do not expect their performance to improve with the investment of effort; consequently withholding effort might not protect the self-esteem of contingent entity theorists.

Three experiments supported these hypotheses. Using different self-handicapping behaviors, and either measuring or priming entity and incremental theories of intelligence, Niiya et al. (2007) showed in two studies that highly contingent students with incremental theories self-handicap by choosing to listen to performance-impairing music and by avoiding practice before a difficult task, but not before an easy task. In a third study, they showed that highly contingent incremental theorists who did not have the opportunity to self-handicap were more likely to attribute their poor performance to ability, and had lower self-esteem following failure.

In sum, these studies show that contingencies of self-worth can undermine self-regulation by leading students to self-handicap prior to difficult tasks, when they believe that, in theory, it is possible to improve through effort.

*Self-validation goals.* Crocker and Park (2004) proposed that contingent self-worth (CSW) undermines self-regulation because people seek to validate their desired images in these domains, prioritizing demonstrating their competence over acquiring competence. For example, students who base their self-worth on academic competence seek to achieve success and avoid failure in academics to validate their academic ability, and hence their self-worth. Self-validation goals, in turn, lead people to approach tasks with an ego-involved focus on their performance, how it compares to others, and what this means about them, creating vulnerability to failure (Grant & Dweck, 2003; Nicholls, 1984). In support of this idea, previously unpublished data (Crocker, 2007) show that academic CSW correlates strongly with academic ability-validation goals ($r = .52$), whereas friendship CSW correlates strongly with the goal

to validate that one is a good friend ($r = .54$) in a sample of first-semester college freshmen (see also Niiya & Crocker, 2008). Ability-validation goals, in turn, predict negative outcomes such as low ability attributions, rumination, and loss of self-worth following real or hypothetical failure or setbacks (Grant & Dweck, 2003).

*Fragile motivation.* Although the desire to prove to oneself and others that one possesses valued qualities can be highly motivating, contingent self-worth creates fragile motivation—in the face of difficulty, students with ability-validation goals tend to lose motivation, withdrawing effort and spending less time on achieving their goals (Grant & Dweck, 2003). In the face of repeated poor outcomes, ability-validation goals lead to downward spirals of performance (Grant & Dweck, 2003).

Our research also suggests that ability-validation goals are fragile goals—people have them only as long as they think they can succeed, and thus validate their ability. For example, Brook (2005, Study 2) had students complete a measure of academic CSW, then do either an easy or difficult academic task. After they completed the task, participants completed a measure of academic ability-validation goals consisting of items such as "It is important for me to confirm my intelligence through my schoolwork" (Grant & Dweck, 2003). For students in the easy task condition, academic CSW was strongly and significantly related to ability-validation goals after the task, consistent with other research. However, after the difficult task, there was no significant association between academic CSW and ability-validation goals, because highly contingent students no longer had the goal of validating their ability. Letting go of one's goal as soon as a task becomes difficult is a hallmark of poor self-regulation; thus self-validation goals associated with contingent self-worth seem to be ineffective guides to self-regulation in the face of obstacles.

*Activity choice.* Because people want to succeed and not fail at tasks related to their contingencies of self-worth, they tend to choose activities with the chances of success in mind, doing the things they do well or expect to succeed at, and avoiding the things they do poorly or think they might fail at. For example, college students whose self-worth is highly contingent on academic success should be particularly likely to disengage from their major, drop courses, or even change majors when their performance lags; they may avoid courses that are outside their "comfort zone," and gravitate toward courses and majors they expect to succeed at. Although focusing on what one does well may facilitate accomplishment of goals much of the time, successful self-regulation often requires learning new skills or improving on one's weaknesses, and therefore stepping outside of the comfort zone of what one does well.

Niiya and Crocker (2007b) gave either an easy or difficult verbal test to students who were high or low on academic contingency, and subsequently gave them the option to either do the same verbal task again or do a different task (a memory task). When the first task was easy, 63.2% of academically contingent students chose to do the same task, whereas when the task was difficult, only 18.2% did. Among less contingent students, only about 30% chose the same task when the first task was easy, and

none chose to do the same task when the first task was difficult. Again, this study indicates that contingencies of self-worth are motivating, but the motivational boost mainly occurs on tasks that are easily accomplished, not on challenging tasks that require persistence and self-regulation.

*Pressure, stress, and mental health symptoms.* Pressure accompanies the motivation provided by contingencies of self-worth (Deci & Ryan, 1995). People with contingent self-worth can feel so much pressure to succeed that they become stressed, anxious, or depressed, or use alcohol and other substances to reduce their anxiety (Crocker & Luhtanen, 2003; Luhtanen & Crocker, 2005; Sargent, Crocker, & Luhtanen, 2006). For example, in the Goals and Adjustment to College Study, early in their first semester freshmen were asked to indicate their most important academic goals for the semester, and then rate how having that goal made them feel. The more students' self-worth was contingent on academics, the more their most important academic goal made them feel obligated, afraid to risk failure, and competitive. They were higher in symptoms of depression, trait anxiety, and stress, at the start of the semester, and across 10 weekly reports they reported feeling more stress, anxiety, depression, disordered eating behaviors, and lower self-esteem in the first semester of college.

*Intrinsic motivation.* The pressure and anxiety associated with contingencies of self-worth can undermine intrinsic motivation, or interest (Deci & Ryan, 1995). In a laboratory experiment, Brook (2005, Study 3) had students complete a measure of basing self-esteem on academics, then do either an easy or difficult academic test. After the test, participants completed a measure of intrinsic motivation. The results revealed a significant interaction between test difficulty and contingent self-worth. Basing self-worth on academics predicted lower intrinsic motivation on the difficult test, but not on the easy test. Thus contingent self-worth seems to undermine intrinsic motivation on difficult tasks, when motivation is most needed.

*Depleting self-regulatory resources.* According to Baumeister et al. (1998), the capacity for self-regulation is like a muscle; it can be strengthened with practice, and exhausted by effort. Self-regulation on tasks such as eating a radish instead of a chocolate chip cookie decreases self-regulation on subsequent, unrelated tasks (e.g., Muraven, Tice, & Baumeister, 1998). Brook (2005, Study 2) proposed that self-regulation is more depleting when self-esteem is at stake. Based on this reasoning, she conducted an experiment in which participants completed a measure of academic contingency of self-worth, then did an easy or difficult academic text-editing task used in previous research on ego depletion (Baumeister et al., 1998). Next, participants worked on a timed anagram task; accuracy on the anagrams task was the critical dependent measure. Results revealed a significant interaction between academic contingency and difficulty of the first task. In the difficult condition, the more students based their self-esteem on academics, the lower their accuracy on the anagrams task. In the easy condition, academic contingency positively (but nonsignificantly) predicted higher accuracy on the

anagrams task, consistent with the idea that contingent self-worth leads to greater self-regulatory depletion after difficult tasks.

*Summary.* In sum, contingent self-worth can be very motivating, because when their self-worth is on the line people really want to succeed and not fail. In domains of contingency, people strive to prove and demonstrate that they have the qualities on which their self-esteem depends. The resulting motivation results in self-regulation through the hot system; goal striving activates feeling afraid and confused, pressured, anxious, and ambivalent. This depletes self-regulatory resources, and is associated with increases in feelings of depression. Although success feels particularly good in domains of contingent self-worth, boosting self-esteem and positive emotions such as pride, failure and setbacks are particularly painful in these domains, because they lead to drops in self-esteem and feelings of shame and powerlessness. Consequently, when self-esteem is at stake self-regulation tends to prioritize maintaining, enhancing, and protecting self-esteem over accomplishing other goals. Strategies such as disengaging from a task, avoiding it altogether, or self-handicapping, can protect self-esteem from failure or setbacks, but ultimately undermine progress toward important goals.

*Learning orientations as a buffer.* In light of the pitfalls that contingencies of self-worth can create for self-regulation, finding a remedy is a high priority for our research. An orientation toward learning, rather than validating or proving one's abilities, can under some conditions buffer contingent self-worth from failure (Grant & Dweck, 2003). However, learning orientations such as incremental theories of ability (Dweck, 2000) or mastery goals (Elliot & Church, 1997) do not necessarily eliminate concerns about self-esteem. Instead, research reviewed here suggests that learning orientations simply shift the calculation regarding when failure implies a lack of ability, and hence lowers self-worth of highly contingent people. Specifically, learning orientations encourage the belief that with effort one can and will improve. Thus, when contingent students fail without exerting high effort, learning orientations can buffer self-esteem. However, when people with learning orientations fail despite investing high effort, the lack of improvement may suggest that they lack the requisite ability, damaging the self-esteem of highly contingent people. Learning orientations such as incremental theories of ability or mastery goals seem to buffer contingent self-worth from failure in the absence of effort, but do not buffer contingent self-worth when people invest effort and still fail.

*Limitations.* Like much research on personality constructs, contingencies of self-worth in our research are measured, not manipulated. This reflects our assumption that contingencies of self-worth are relatively stable over time, if not fixed. Because we have not manipulated contingencies of self-worth, we cannot rule out alternative explanations, such as the possibility that other variables, correlated with the contingencies, can account for our effects. Although we are skeptical that it is possible to manipulate contingencies of self-worth, researchers might be able to manipulate the salience

of specific contingencies in the future. Because contingencies likely cannot be manipulated, more recent research has focused on how goals related to contingencies of self-worth influence these various self-regulatory outcomes, because goals are more malleable and can be manipulated.

## Self-Image Goals and Self-Regulation

People not only want to maintain, protect, and enhance self-esteem by proving to themselves that they satisfy their contingencies of self-worth; they also want others to notice and acknowledge that they have desired qualities. As the familiar quip suggests, people think, "Enough about me, what do *you* think about me?" When people have self-image goals, they construct, maintain, and defend desired public images of the self to gain or obtain something for the self. In other words, people do not passively wait for others to appreciate their desirable qualities; they actively strive to ensure that others "get" their desired images and do not see them in undesired ways (Schlenker, 2003). For example, students with the desired self-image "smart" will not only try to perform well academically to prove their intelligence, they also do things so others will see them as smart, such as frequently answering questions in class, criticizing others' ideas, and telling people about their high grades. They also do things to ensure that others do not see them as unintelligent, such as not raising their hand unless they are sure their answer is correct, avoiding asking questions when they are confused, and either downplaying how hard they study, or even avoiding studying, to prevent others from concluding that a poor performance reflects lack of ability.

Self-image goals can help people get their needs met when others' impressions determine inclusion, acceptance, advancement, or status (Leary, 2007; Schlenker, 2003). It would be reckless to go to a job interview or sales meeting without considering the appropriateness of one's attire and demeanor, and the competencies one wants to convey. People who never consider the impressions others form of them will likely be socially inept and professionally unsuccessful. At times, taking into account the impressions others form of the self and their judgments and reactions to those impressions can even be lifesaving. For example, women are often encouraged to appear attentive and alert when walking in cities at night, lest they appear vulnerable and become prey for criminals. In some situations, self-image goals contribute to achieving larger aims.

Although self-image goals are indispensable at times, they have insidious effects on self-regulation and goal pursuit. Just as contingencies of self-worth can lead people to prioritize self-esteem protection over making progress toward their goals, self-image goals can lead people to prioritize constructing their desired appearance or image over reality. For example, students who want others to see them as smart may be reluctant to admit to confusion, and ask for help or clarification (see Fisher, Nadler, & Whitcher-Alagna, 1982, for a review). Although hiding their confusion may protect

their public images of intelligence or competence, not asking for help when confused ultimately undermines developing intelligence and competence. A person with the desired image "good mother" may avoid setting limits that make her child angry, especially in public. In doing so, she may sacrifice being a good mother in favor of appearing to be a good mother. The short-term face-saving benefits of self-image goals can have long-term costs for more important goal pursuits.

Like contingent self-worth, self-image goals typically implicate the "hot system" of self-regulation (Metcalfe & Mischel, 1999). Striving to construct desired images can lead to anxiety that others will discover a flaw or behavior that is inconsistent with the desired image (Leary, 1983). For example, the job candidate attempting to construct a self-image as competent and smart may fear being asked difficult questions which could reveal a gap between the image and reality. Exposure of a gap between an inflated self-image and the flawed reality of the self triggers negative self-conscious emotions such as shame (Tracy & Robins, 2004), which is associated with increases in cortisol levels and undermines immune system functioning (e.g., Dickerson, Gruenewald, & Kemeny, 2004). In its extreme form, exposure may induce a state of humiliated rage (Tangney, 1990). The negative self-relevant affect associated with public exposure of setbacks and failures may interfere with self-regulation, causing people to give up on difficult goals.

Constructing and maintaining a desired image also limits cognitive capacities. Worrying about public images makes people self-conscious, focusing their attention on how they appear to others, rather than their internal states or demands of the task (Fenigstein, Scheier, & Buss, 1975; Fredrickson & Roberts, 1997). Allocating attention to how one appears to others can undermine performance on difficult tasks (Fredrickson, Roberts, Noll, Quinn, & Twenge, 1998; Quinn, Kallen, Twenge, & Fredrickson, 2006). Concern about constructing and protecting desired images of the self as competent may contribute to stereotype threat effects, in which members of groups stereotyped as low in ability underperform on tests when their identity is salient (Steele, Spencer, & Aronson, 2002). Ironically, concealing undesired self-aspects to construct or protect a desired self-image may place further demands on cognitive capacities, and subsequently increase the cognitive accessibility of undesired self-aspects (Smart & Wegner, 1999). Thus self-image goals use cognitive resources that otherwise could be devoted to performing tasks more effectively.

Finally, when people construct desired images they become disconnected from other people; in emphasizing appearance over reality, people become inauthentic and even manipulative (D. T. Miller, 2006), undermining their social support and increasing loneliness (D. T. Miller, 2006).

### *Empirical Evidence*

Evidence for the effects of chronic self-image goals on self-regulation and related processes comes from the Goals and Adjustment to College Study. Recall that students

completed pretest measures at the beginning of their first semester of college and posttest measures at the end of their first semester. In between they completed a weekly web-based survey, which assessed their goals, academic experiences, and relationships in the past week. Self-image goals were assessed in two domains of central important to almost all college freshmen: friendships and academics. Specifically, students rated how much they wanted or tried to "get others to recognize or acknowledge your positive qualities," "avoid showing your weaknesses," "avoid taking risks or making mistakes," and "convince others that you are right" ($\alpha = .83$). All items began with the phrase, "In the past week, in the area of *academics*, how much did you want to or try to: . . ." A parallel set of items began with the phrase, "In the past week, in the area of *friendships*, how much did you want to or try to: . . .". Chronic self-image goals in these two domains were highly correlated, $r\ (199) = .89$, $p < .001$, indicating that people who chronically have self-image goals in one domain also have them in the other. All analyses of these data controlled for gender and social desirability, to rule out obvious alternative explanations. (These analyses also controlled for compassionate goals, described in a later section.)

*Personality correlates of chronic self-image goals.* What are people who chronically have self-image goals like? The Goals and Adjustment study included several personality measures in the pretest and posttest questionnaires. Crocker and Canevello (2008) examined the association between self-image goals for friendships and these measures. People with chronically high self-image goals viewed their social interactions as zero-sum in nature, with gains for one person coming at the expense of another. They felt that they deserved more than others, indicated by higher scores on the Psychological Entitlement Scale (Campbell, Bonacci, Shelton, Exline, & Bushman, 2004). They had a judgmental stance toward their own weaknesses and shortcomings, as indicated by their lower scores on the Self-compassion scale (Neff, 2003). They scored higher on public self-consciousness and social anxiety (Fenigstein, 1987; Fenigstein et al., 1975), and both anxious and avoidant styles of attachment insecurity (Brennan, Clark, & Shaver, 1998). These findings indicate that people with chronic self-image goals have an egosystem perspective on the self in relation to others, in which they must compete with others for resources and control how others view them to get what they want.

*Affective correlates of chronic self-image goals.* Consistent with the idea that people with chronic self-image goals tend to self-regulate in the hot system, chronic self-image goals were associated with more intense, and usually negative, affect. Participants indicated their most important academic and friendship goal each week, and rated how having that goal made them feel. Averaged across the 10 weekly reports, and the friendship and academic domains, participants with chronic self-image goals reported that their most important goals in these domains made them feel a composite of confused, ambivalent/conflicted, pressured, fearful, critical, distracted, isolated, and competitive (Moeller, Crocker, & Canevello, 2008). They also reported feeling a composite of

powerless, weak, ashamed, inferior, out-of-control, and victimized following setbacks toward important goals. Of course, people with self-image goals can experience positive affect when things go well; students with high self-image goals reported that progress toward their goals made them feel strong, powerful, admirable, and superior in response to progress toward important goals.

In sum, the more participants chronically had self-image goals, the more afraid and confused their academic and friendship goals made them feel. Although self-image goals were associated with positive self-relevant emotion following goal progress, they were more strongly associated with negative self-relevant emotion following goal setbacks.

*Self-image goals predict performance-focused achievement goals.* At pretest and posttest, students completed measures of achievement goals. We assessed Elliot and Church's (1997) performance-focused achievement goals: performance-approach goals, focused on outperforming others (e.g., "It is important for me to do better than other students.") and performance-avoidance goals, focused on not performing badly (e.g., "I just want to avoid doing poorly in my classes."). We also included Grant and Dweck's (2003) measure of ability-validation goals (e.g., "In school I am focused on demonstrating that I am very intelligent.").

Students who were chronically high in self-image goals had significantly higher performance-approach, performance-avoidance, and ability-validation goals at both pretest and posttest. More importantly, self-image goals predicted residual change in each of these goals at posttest, controlling for pretest goals. In other words, students who chronically focused on constructing desired self-images became increasingly driven by performance and ability-validation goals over their first semester of college (Crocker, Niiya, & Luhtanen, 2007). Performance and ability-validation goals undermine self-regulation on difficult tasks (Grant & Dweck, 2003).

*Self-image goals predict goal setbacks.* Students with higher self-image goals had more difficulties over the semester achieving their goals. Each week, students indicated their most important academic and friendship goal that week, and rated how much they made progress and experienced setbacks toward those goals. Chronic self-image goals predicted increased reports of setbacks toward important academic and friendship goals across the 10 weekly reports. Self-image goals did not predict reports of goal progress.

*Self-image goals do not predict self-regulation.* We expected that self-image goals contribute to setbacks because students with self-image goals self-regulate poorly. Students reported how often in the past week they got all their homework, studying, and tests done on time, focused on their most important academic goals, resisted distractions and focused on their studies, gave their best effort to academics, felt very productive, procrastinated (reversed), and fell behind in their academic work (reversed). In the friendship domain, students reported how much they focused on their most important friendship goals, gave their best effort to their friendships, put

off spending time with friends to focus on other things (reversed), and resisted distractions and focused on their friends. To our surprise, students with more self-image goals did not report more difficulty self-regulating, either in the academic or friendship domain, suggesting that goal setbacks were not due to difficulty keeping academic goals in mind.

*Feeling afraid mediates the relation between self-image goals and goal setbacks.* Further analyses indicated that the effect of self-image goals on goal setbacks can be explained by the fearful, confused, and pressured feelings associated with high chronic self-image goals. That is, self-image goals predicted feeling afraid, which in turn, predicted goal setbacks. The mediated path from self-image goals to goal setbacks through feeling afraid was significant in both the academic (Sobel's $z = 4.49$, $p < .001$) and friendship (Sobel's $z = 4.66$, $p < .001$) domains.

In sum, initial evidence indicates that chronic self-image goals interfere with achieving important self-regulatory goals because they are linked with negative goal-related feelings, such as feeling afraid, pressured, and conflicted, which predict goal setbacks.

## Contingencies of Self-Worth and Self-Image Goals

We have argued that egosystem motivation involves both contingent self-worth and self-image goals. Research described here suggests that both can undermine self-regulation, especially on difficult tasks or following goal setbacks. But what is the connection between these public and private aspects of egosystem motivation? Crocker and Park (2004) suggested that contingencies of self-worth shape people's goals, which in turn account for many of the negative effects of contingent self-worth. In other words, they proposed a meditational pathway from contingencies to outcomes through goals. Supporting this suggestion, they cited evidence that contingencies of self-worth are strongly correlated with self-validation goals in those domains. Furthermore, we described evidence that self-validation goals are strongly related to self-image goals. But do self-image goals mediate the effects of contingencies of self-worth on self-regulation and related processes, such as emotion?

Unpublished data from the Goals and Adjustment to College Study allow a preliminary test of this hypothesis (Moeller & Crocker, 2008a). In that study, students completed subscales of the Contingencies of Self-Worth scale at the start of their first semester of college. We previously described results showing that scores on the academic contingency subscale predict academic self-image goals ($\beta = .42$, $p < .001$). We also described evidence that academically contingent students' important academic goals make them feel afraid and confused, that progress makes them feel proud and powerful, and setbacks make them feel ashamed and powerless. Across 10 weekly reports they reported feeling more stress, anxiety, and depression, and experiencing disordered

eating behaviors and lower self-esteem in the first semester of college. More contingent students (measured at the start of the semester) had more performance-oriented achievement goals (avoidance, approach, and ability-validation) at the end of the semester. Do self-image goals associated with academic CSW account for these effects? To address this issue, we conducted regression analyses predicting these outcomes from academic CSW, academic self-image goals, and academic compassionate goals, controlling for gender and social desirability.

*Self-relevant affect.* The results clearly support the hypothesis that chronic self-image goals account for the association between academically contingent self-worth and self-relevant affect. Specifically, when we included both self-image goals and compassionate goals as predictions of fearful and confused goal-related feelings, feeling proud and powerful following academic progress, and feeling ashamed and powerless following academic setbacks, the previously significant effects of academic CSW all became nonsignificant, and self-image goals, but not compassionate goals, significantly predicted each of these affective outcomes. Tests of mediation were significant for all 3 affective outcomes, including fearful and confused goal-related feelings (Sobel's $z = 4.07$, $p < .001$), feeling proud and powerful following academic progress (Sobel's $z = 2.37$, $p < .05$), and feeling ashamed and powerless following academic setbacks (Sobel's $z = 3.53$, $p < .001$).

*Stress.* Academic CSW predicted more stress over the semester; self-image goals completely mediated this effect (Sobel's $z = 2.71$, $p < .01$).

*Loneliness.* Academic CSW predicted more loneliness over the semester; self-image goals partially mediated this effect (Sobel's $z = 3.96$, $p < .001$).

These results indicate that self-image goals fully or partially mediate the association between academically contingent self-worth and subsequent self-relevant affect, stress, and loneliness. Furthermore, they suggest that contingencies of self-worth activate the "hot" system of self-regulation through the type of goals they elicit.

*Well-being.* In contrast to self-relevant affect, stress, and loneliness, self-image goals did not mediate the effects of pretest academic CSW on average weekly self-esteem, anxiety, depression, and disordered eating behaviors (Sobel's $z$s were nonsignificant) Instead, academic CSW and chronic self-image goals each accounted for unique variance in (poor) well-being.

*Achievement goals.* Pretest academic CSW predicted performance-oriented achievement goals (approach, avoidance, and ability-validation goals) at posttest. These effects remained highly significant when we controlled for average self-image and compassionate goals, and self-image goals explained unique variance in performance-oriented achievement goals. Tests of mediation were nonsignificant.

In sum, these analyses indicate that Crocker and Park (2004) were only partly right when they suggested that the effects of contingent self-worth are mediated through

self-image goals. The mediated path through self-image goals was significant for self-relevant emotion, stress, and loneliness. However, academically contingent self-worth and academic self-image goals each accounted for unique variance in students' average well-being in their first semester of college, and their performance-oriented achievement goals at the end of the first semester. This suggests that the public and private aspects of egosystem motivation are connected, but not completely overlapping. With regard to self-regulation, self-image goals explain why egosystem motivation activates the hot system, which undermines self-regulation and consequently goal progress.

## Compassionate Goals and Self-Regulation

Research on self-image goals has contrasted them with another type of goal, reflecting *ecosystem* motivation (Crocker, 2008; Crocker, Garcia, & Nuer, 2008). Crocker and her colleagues draw on the biological notion of an ecosystem as a metaphor for a motivational perspective on the self in which people see themselves as part of a larger whole, a system of separate individuals whose actions nonetheless have consequences for others, with repercussions for the entire system, that ultimately affect the ability of everyone to satisfy their needs. In this framework, people view the relationship between the self and others as nonzero-sum—what is good for one person can also be good for others. They feel clear and connected to others. In ecosystem motivation people prioritize the needs of others, not out of virtue or self-sacrifice and not because others are part of the self, but rather because they genuinely care about the well-being of others. These feelings elevate and inspire people to improve, grow, and expand their capacities (Haidt, 2003). *Compassionate goals* to be constructive and supportive of others typically reflect ecosystem motivation (Crocker, 2008).

### *Compassionate Goals as an Alternative to Self-Image Goals*

We hypothesize that compassionate goals foster self-regulation and help people achieve their most important goals; such goals do not activate the "hot" system of self-regulation, with its attendant problems, but a "warm" system in which people care deeply without being ego-involved in outcomes. Like the hot system associated with self-image goals, the warm system is emotional; it is not a dispassionate "cold" system. However, in contrast to the hot system, the affect associated with the warm system is other-directed, rather than self-directed. In other words, in the warm system, people feel loving and compassionate, rather than afraid and confused. Their goals make them feel clear and connected to others, progress makes them feel humble, and setbacks make them feel determined and realistic. We propose that, as in the cool system proposed by Metcalfe and Mischel (1999), this warm self-regulatory system

allows people to keep their long-term goals in mind and monitor their progress along the way.

We hypothesize that compassionate goals benefit self-regulation for several reasons. Because compassionate goals allow people to keep their goals in mind and monitor their progress, people with compassionate goals should stay focused on their most important goals. Second, compassionate goals provide a powerful source of motivation without ego-involvement; they help people transcend the self (Crocker, Niiya, & Mischkowski, 2008). Consequently, people with compassionate goals can construe failure as an opportunity to learn or improve, similar to what Haidt (2003) calls "elevation," rather than dwelling on what failure signifies about self-images or self-worth. That is, compassionate goals should promote a learning orientation.

### *Initial Evidence that Compassionate Goals Benefits Self-Regulation*

In several studies, we have found that self-image goals and compassionate goals are not opposite ends of a single continuum, nor are they completely independent of one another. Rather, self-image goals and compassionate goals averaged over time correlate positively (*r*s ranging from .27 to .50). It seems likely that people who care about the domains of academics or friendships have both types of goals. Consequently, in all analyses we include both goals as predictors, to assess their unique effects.

The Goals and Adjustment to College Study included a measure of compassionate goals in the domains of friendships and academics, in addition to the measure of self-image goals. Students rated how much in the past week they wanted or tried to have compassion for others' mistakes and weaknesses, be supportive of others, avoid being selfish or self-centered, avoid doing anything that would be harmful to others, be constructive in their comments to others, make a positive difference in someone else's life, and avoid doing things that aren't helpful ($\alpha = .90$). All items began with the phrase, "In the past week, in the area of *academics*, how much did you want to or try to: . . ." A parallel set of items began with the phrase, "In the past week, in the area of *friendships*, how much did you want to or try to:. . . ."

*Personality correlates of chronic compassionate goals.* What are people who chronically have compassionate goals like? Crocker and Canevello (2008) examined the association between compassionate goals for friendships and several personality measures. People with chronically high compassionate goals feel connected to other living things, and to people outside their immediate community or group; they score high on the universality and connectedness subscales of the Spiritual Transcendence scale (Piedmont, 1999). They tend not to view their social interactions as zero-sum in nature, with gains for one person coming at the expense of another, and tend to be low in psychological entitlement (Campbell et al., 2004). They are high in self-compassion and low in self-judgment, as assessed by the Self-Compassion scale (Neff, 2003). They score high on private self-consciousness, but not public self-consciousness or social

anxiety (Fenigstein, 1987; Fenigstein et al., 1975). Chronic compassionate goals are unrelated to attachment anxiety, and negatively related to attachment avoidance (Brennan et al., 1998). These findings indicate that people with chronic compassionate goals have an ecosystem perspective on the self in relation to others, in which caring about the well-being of others is not detrimental to the self.

*Affective correlates of chronic compassionate goals.* Consistent with the idea that people with chronic compassionate goals tend to self-regulate in a "warm" system, these goals were associated with positive, calm, other-directed affect. Specifically, averaged across the 10 weekly reports, and the friendship and academic domains, participants with chronic compassionate goals reported that their most important goals made them feel a composite of feeling connected to others, loving, present, engaged, peaceful, cooperative, empathic, and clear (Moeller et al., 2008). Compassionate goals predicted feeling humble, human, compassionate, and curious in response to progress toward important academic and friendship goals. They also predicted feeling a composite of feeling determined, realistic, human, wanting to learn, responsible, and authentic following setbacks toward important academic and friendship goals. In sum, the more participants had compassionate goals, the more clear and connected their academic and friendship goals made them feel. Compassionate goals were associated with feeling humble following goal progress, and determined and realistic following goal setbacks. Thus people with chronic compassionate goals do not experience the same degree of emotional highs following success or lows following failure that people with chronic self-image goals experience. These results support our view that compassionate goals self-regulate within a warm system, in which people feel calm, loving, and connected to others.

*Compassionate goals predict learning-oriented achievement goals.* At pretest and posttest, students in the Goals and Adjustment to College Study completed measures of three learning-oriented achievement goals: mastery goals (Elliot & Church, 1997), the goal to acquire knowledge (Niiya & Crocker, 2007a), and the goal to learn from failure (Niiya & Crocker, 2007a). Students who were chronically high in compassionate goals had significantly higher mastery, knowledge, and learning from failure goals at both pretest and posttest. More importantly, chronic compassionate goals predicted residual change in knowledge and learning from failure goals (but not mastery goals) at posttest, controlling for pretest goals. In other words, students who chronically focused on being compassionate became increasingly motivated by learning over their first semester of college (Crocker et al., 2007). Learning orientations, in turn, help students self-regulate by encouraging them to view setbacks and failures as opportunities to improve, rather than self-threats (Crocker & Park, 2004).

*Compassionate goals predict self-regulation.* We expected that compassionate goals contribute to goal progress because students with compassionate goals show good self-regulation. As expected, students with higher compassionate goals reported self-regulating better, in both the academic and friendship domains.

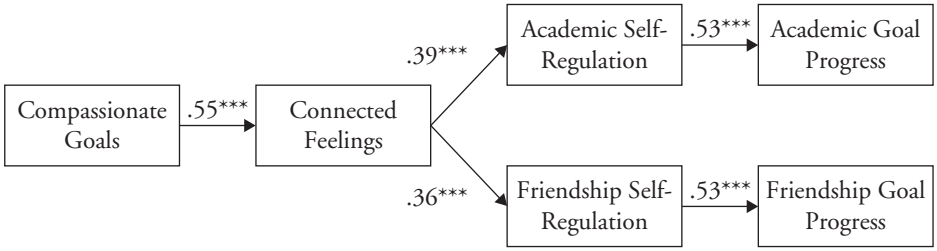


**Figure 18.1.** Path model of the effects of compassionate goals on self-regulation and goal progress. Path coefficients are standardized regression coefficients. All regression analyses controlled for gender and social desirability, and for prior variables in the model (to the left of the predictor variable).

*Compassionate goals predict goal progress.* Moeller et al. (2008) hypothesized that compassionate goals predict progress toward important academic and friendship goals. Each week, participants rated how much progress they made toward their most important academic and friendship goal of the past week. Students with higher compassionate goals reported making more progress toward their important academic and friendship goals across the 10 weekly reports, indicating that compassionate goals benefit self-regulation in at least two self-regulatory domains. Compassionate goals did not predict reports of goal setbacks. Consistent with the reports of goal progress, especially in the friendship domain, students with higher compassionate goals also increased in perceived available support over the first semester of college (Crocker, 2008).

*A path model of the effects of compassionate goals.* We hypothesized that the relation between compassionate goals and goal progress could be explained by feeling clear and connected about the goal, which in turn predicts improved self-regulation, which in turn predicts goal progress. Path analyses, shown in Figure 18.1, supported this hypothesis. People with high chronic compassionate goals experience more goal-related feelings of connection, which facilitates self-regulation, which in turn predicts goal progress.

## *Feeling Connected Also Predicts Goal Progress Through Feelings about Setbacks*

Compassionate goals emphasize a connection to something larger than the self. Thus goal setbacks should not hold the same negative consequences for the self, nor should goal setbacks engender the same feelings of shame and powerlessness as setbacks associated with self-image goals. Instead, we predict that people with chronic compassionate goals become more determined and resolute following setbacks, which should, in turn, lead to more goal progress.

*Feeling connected versus feeling afraid and emotions regarding goal setbacks.* In a different study, we recruited 86 undergraduates for a study on adherence to self-improvement resolutions (Moeller & Crocker, 2008b). Participants selected a poor habit that they wished to change over the course of 3 weeks and attempted to actually implement the positive change (e.g., "stop procrastinating," "eat more vegetables," "exercise 3 times per week"). One week and 2 weeks later, participants reported on the extent to which they experienced progress and setbacks over the course of each week on their goal. If they experienced setbacks, participants reported how having those setbacks made them feel by completing a 12-item emotion scale; two subscales were derived from this scale, which we labeled *powerless feelings about setbacks* (powerless, weak, ashamed, out of control, inferior) and *determined feelings about setbacks* (determined, human, authentic, wanting to learn, realistic, responsible), respectively. Feeling connected at baseline predicted feeling more determined about setbacks 1 week later, whereas feeling afraid predicted feeling more powerless. Importantly, feeling determined then predicted more progress the following week. That is, feeling connected at Time 1 predicted feeling determined about setbacks at Time 2, which then predicted goal progress at Time 3. The test of mediation for this relationship was significant (Sobel's $z = 2.24$, $p < .05$). Thus people who have connected feelings about their goals appear to turn their failures into determination, which then helps them to better self-regulate.

### *Summary*

In sum, students who chronically have compassionate goals feel clear about their goals and connected to others; feeling connected fosters self-regulation, which leads to goal progress. Furthermore, students whose goals make them feel connected feel more realistic and determined, as opposed to powerless, if setbacks arise. Feeling determined about setbacks leads to more progress.

## Future Directions

Our suggestion that there is a third self-regulatory system between the hot and cold system—a warm system that involves positive other-directed affect—requires more research. The possibility of such a system is intriguing, however, in light of evidence described here that feeling clear, loving, and connected fosters self-regulation and goal progress. In other research, we have shown that one self-affirmation manipulation, the values-affirmation paradigm, has powerful effects on feelings of love and connection, which account for the effects of this manipulation on reduced defensiveness to self-threatening information (Crocker, Niiya, & Mischkowski, 2008). This warm system may downregulate responses to threat, perhaps through caregiving hormones such

as oxytocin (Taylor et al., 2000), facilitating self-regulation and goal attainment in potentially threatening circumstances.

## Conclusions

Chronic egosystem motivation undermines self-regulation and achievement of goals. Both the desire to prove that one satisfies contingencies of self-worth, and the desire to make sure others recognize and acknowledge one's desired qualities, activate the "hot" system of self-regulation. Because of the intense emotion associated with egosystem motivation, particularly the negative feelings such as shame and powerlessness following setbacks, self-regulation is easily coopted, so people pursue protection of self-esteem and desired images instead of the goals that originally inspired them. Although self-esteem and admiration feel good, the cost of pursuing them is high. Compassionate goals foster self-regulation through the warm system, and help people achieve their important goals while creating and sustaining emotional connections to others.

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# 19

# *Self-Regulation of State Self-Esteem Following Threat*

## Moderation by Trait Self-Esteem

**Michelle R. vanDellen, Erin K. Bradfield, and Rick H. Hoyle**

Most people hold a relatively high opinion of themselves. A recent study reported that in 2006 more than half of high school students selected *very good*, the most positive response option on a five-point scale, to describe how they expect to be judged as parents and spouses. Almost two thirds reported that they would be *very good* workers (Twenge & Campbell, 2008). People overestimate their popularity (Zuckerman & Jost, 2001), their driving skills (Svenson, 1981), and their grammar (Kruger & Dunning, 1999). People even tend to think that they are above average at being unbiased when they evaluate themselves (Pronin, Lin, & Ross, 2002).

In addition to these specific identities and characteristics, individuals tend to hold highly positive views of themselves in general. The later decades in the 20th century witnessed an increase in global self-esteem among college students, with mean scores suggesting that the majority of college students think more positively than negatively of themselves (Twenge & Campbell, 2001). In laboratory studies that examine trait self-esteem as a moderator variable, the median score on standard measures of self-esteem typically is well above the scale midpoint (Brockner, Derr, & Laing, 1987; Kernis, Cornell, Sun, Berry, & Harlow, 1993). In many studies, even individuals classified as "low self-esteem" report self-esteem that is more positive than negative (Aspinwall & Taylor, 1993; Rudich & Vallacher, 1999).

These specific and general self-appraisals influence the expectations that people bring to social situations, expectations they expect to be confirmed by social feedback (Snyder & Swann, 1978). Thus most people expect to receive confirmation that they are correct in assuming that they are good drivers, popular, and make great workers. Even when people do not hold expectations regarding a specific identity or characteristic

relevant in a given situation, their generally high opinion of themselves leads them to expect positive social feedback and performance success regardless of the situation (McFarlin & Blascovich, 1981).

Because people gravitate toward situations likely to yield social feedback consistent with their expectations, their expectations often are met. Yet people cannot always choose the situations they encounter. Moreover, social life, in its complexity, does not always unfold as expected. In short, what people expect may be at odds with what they encounter in a given situation. Indeed, the higher the opinion an individual holds of himself or herself, the greater the likelihood that this self-view will be challenged in the course of everyday social life.

The focus of this chapter is self-regulatory strategies by which individuals with high trait self-esteem attempt to maintain their high opinion of themselves in the face of disconfirming feedback. Because self-esteem serves important social and psychological functions (Baumeister & Leary, 1995; Greenberg et al., 1992), we expect that challenges to it—even the *potential* for challenges to it—will instantiate self-regulatory strategies aimed at bolstering or restoring self-esteem. Following a discussion of when and how self-esteem is regulated, we present findings from our research on the sensitivity of state self-esteem to characteristics of social situations. We then present findings from two lines of research in which we have examined cognitive and affective reactions to social feedback relevant to self-esteem.

## Self-Regulation of State Self-Esteem

Self-regulation involves managing discrepancies between reality and expectations or desires (Carver & Scheier, 1981). When the discrepancy between individuals' perception of reality and their expectations or desires is of sufficient magnitude, they may experience increased negative affect (Duval & Wicklund, 1972). They are motivated to reduce this negative affect by decreasing the discrepancy between expectation and reality. Discrepancy reduction can be achieved either through a change in expectations, a reconstrual of reality, or by exiting the situation. Self-regulation is successful when the discrepancy is either eliminated or reduced to a point at which the level of negative affect returns to baseline (Carver, & Scheier, 1990; Rothbaum, Weisz, & Snyder, 1982).

Trait self-esteem reflects individuals' opinions of themselves, and therefore what they expect to be reflected in everyday social life. The college student who views herself very positively expects good grades, compliments on her appearance, and generally positive interactions. The factory worker who harbors doubts about his work-related skills is not surprised when his supervisor passes by without acknowledging him. These examples highlight the fundamentally different concerns for individuals high in self-esteem compared to their low self-esteem counterparts. On average the evaluative expectation of individuals with low self-esteem should routinely be met, if not exceeded, and, although more positive feedback than expected is a departure from expectation,

it is hardly a threat and may not prompt self-regulation (Carver, Lawrence, & Scheier, 1999). For people with high self-esteem, however, departures from expectation are virtually always in the direction of more negative feedback than expected. As such, it is people with high self-esteem who are most likely to encounter threatening social feedback, and therefore are most in need of effective strategies for regulating self-esteem.

Although the evaluative expectations individuals bring to social situations are anchored to their trait self-esteem, it is their state self-esteem that is subject to fluctuation when expectations are not met. For a specific individual under normal circumstances, state self-esteem does not vary a great deal from trait self-esteem. Indeed, if one sampled an individual's state self-esteem across many situations, one might expect an approximation of a bell-shaped curve centered on the individual's trait self-esteem score. As noted, however, for individuals with high trait self-esteem, the distribution is negatively skewed because the likelihood of feedback that exceeds expectations is lower than the likelihood of feedback that fails to meet expectations.

What circumstances might produce social feedback that does not meet expectations, yielding a drop in state self-esteem for individuals high in trait self-esteem? The sociometer model posits that state self-esteem is pegged to the perception of relational value in the moment (Leary, 2002). Because people with high trait self-esteem expect to be socially accepted, they should experience a temporary decline in state self-esteem when their relational value is called into question. A growing literature supports this hypothesis. For instance, when individuals experience social rejection in a laboratory setting, their state self-esteem decreases (Leary, Tambor, Terdal, & Downs, 1995). Simply recalling past instances of social exclusion is enough to lead to a drop in state self-esteem (Gardner, Pickett, & Brewer, 2000). Even among people who deny that social relations matter to their self-evaluation, social feedback influences state self-esteem (Leary et al., 2003). This link between social experience and state self-esteem suggests that underlying the self-regulation of state self-esteem is a fundamental need to maintain a desired level of relational value.

A second, broad category of feedback that is inconsistent with the expectations of people with high self-esteem is negative feedback about ability, socially valued personal characteristics (e.g., physical appearance), or performance. For instance, state self-esteem suffers when individuals are subjected to negative feedback about intelligence or academic competence (e.g., Aspinwall & Taylor, 1993; Baumeister & Tice, 1985). Similarly, when personality or social competence are called into question, state self-esteem suffers (e.g., Baumgardner, Kaufman, & Levy, 1993; Brown, Collins, & Schmidt, 1988). Our research suggests that negative feedback of this sort threatens self-esteem not only because it is inconsistent with expectations. Relational value is attached to many competencies and performances, meaning that negative feedback may also undermine feelings of relational value. This seems to be true especially in areas on which self-esteem is contingent (vanDellen, Hoy, & Hoyle, in press).

The maintenance of high self-esteem requires effective self-regulatory strategies for managing the inevitable social feedback that would suggest that a strongly positive self-evaluation is perhaps unwarranted. One way people with high self-esteem manage

bruised state self-esteem is to reflect on their overall view of themselves. This reminder of their typically positive self-view can buffer them from threats to their self-view in the moment (Steele & Liu, 1983; Tesser & Cornell, 1991). Furthermore, when faced with a threat to self-worth, individuals may consider their virtues in domains unrelated to the threat, bolstering their self-feelings without dwelling on the discrepancy at hand (Aronson, Blanton, & Cooper, 1995). Individuals with high self-esteem may be particularly skilled at such self-affirmation strategies because positive thoughts of the self are clearer and more accessible (Campbell, 1990; Steele, Spencer, & Lynch, 1993). Additionally, a variety of attributional strategies allow people with high self-esteem to discount negative feedback or discredit the sources of such feedback in the service of high state self-esteem (Taylor & Brown, 1988). Indeed, it appears that individuals with high self-esteem are able to draw on an array of self-esteem maintenance strategies in order to choose in a given situation the one least subject to challenge by threatening feedback (Tesser, 2000).

## Cross-Situational Variability in State Self-Esteem

It is now well established that state self-esteem fluctuates across time and situations (e.g., Kernis et al., 1993). In fact, the degree to which state self-esteem fluctuates over time is a reliable indicator of individual differences in the stability of self-esteem (Kernis & Goldman, 2006). We posit that state self-esteem fluctuates because of the inherent uncertainty in many, if not most, social situations. For instance, although individuals' behavior is highly predictable across situations, within situations it is not. As such, we have no guarantee that our generally kind and generous friend will, on this day and in this encounter, be kind and generous toward us. We noted earlier that, although people generally gravitate to situations likely to pull for their preferred outcomes and behaviors, they do not have complete control over people and situations that, in effect, choose them. Even in situations individuals choose, there is a chance that an unanticipated behavior by oneself or some other unanticipated factor will raise questions about an identity, a competency, or relational value. In short, threats to state self-esteem are inevitable.

If our analysis is correct, then we should expect to see greater variability in state self-esteem across situations that are inherently unpredictable as compared with those that are relatively predictable. To test this hypothesis, we conducted an event-contingent experience sampling study of college students. For a period of seven days, approximately 90 students carried a small booklet of "interaction records" with them at all times (cf. Wheeler & Nezlek, 1977). Each time they participated in a social interaction of 10 minutes or longer, they completed an interaction record as soon as possible after the interaction ended. On the interaction records, participants provided information about the interaction such as the number of people present, where the interaction took place, and what took place during the interaction. In addition, for

each interaction, the participants completed three state self-esteem items, indicating on a −4 to +4 scale whether the interaction left them feeling better or worse about themselves. On average, participants provided information about 38 interactions, allowing us to examine variability in state self-esteem as a function of characteristics of situations.

Following standard practice, we calculated the standard deviation of state self-esteem scores, but rather than calculating an overall standard deviation, we calculated separate standard deviations for interactions at different levels of selected features of situations. For instance, participants indicated which interactions took place at their living quarters or elsewhere. We reasoned that interactions near their living quarters would be more predictable and controllable, and therefore less likely to influence state self-esteem than interactions that took place elsewhere. We evaluated this reasoning by comparing the standard deviation of state self-esteem scores for interactions that took place at their living quarters to those that took place elsewhere. We used this strategy to evaluate the effect of five features of social situations on state self-esteem.

The results were as follows:

- State self-esteem was more variable across interactions away from students' living quarters than interactions at their living quarters.
- The more people involved in the interaction, the greater the variability in state self-esteem.
- Interactions that involved conflict produced greater variability in state self-esteem than interactions that did not involve conflict.
- Participants' state self-esteem was more variable when they anticipated a future interaction with the same individuals compared to when they did not.
- State self-esteem was less variable in interactions involving the individuals that participants listed as those they interact with most frequently as compared to interactions not involving those people.

What these seemingly disparate characteristics of situations share in common is that they distinguish social interactions that are relatively predictable and controllable (e.g., interactions at home, interactions with people one sees relatively often) from those that are not (e.g., interactions involving conflict, interactions that involve numerous coactors). The findings show that, in an absolute sense, cross-situational variability in state self-esteem is typical (all standard deviations differed significantly from zero). They also show that fluctuations in state self-esteem are most likely in situations that are the least predictable and controllable.

## Self-Esteem Threats and Attributional Responses

We noted earlier that one approach used by people with high self-esteem to manage state self-esteem when it is challenged is strategic attribution. In a second line of research,

we focused specifically on attributions following threats to self-esteem, with a particular focus on the degree to which the use of self-esteem-maintaining attributions differs between people high versus low in trait self-esteem. Because individuals with high self-esteem experience greater discrepancy between expectations and reality when they receive negative social feedback, we expected to see greater activity by these people following such threats compared to their low-self-esteem counterparts. Relevant comparisons in the literature have generally supported this expectation. In a meta-analysis of the self-serving bias, large differences between individuals with relatively low and relatively high trait self-esteem emerged, such that those with high self-esteem demonstrated the self-serving bias (external attributions following negative feedback, internal attributions following positive feedback), whereas those with low self-esteem did not (Campbell & Sedikides, 1999). Furthermore, individuals with high self-esteem are more likely to blame external factors for their failure, while individuals with low self-esteem are more likely to accept responsibility for failure (Feick & Rhodewalt, 1997; Fitch, 1970). This self-serving bias occurs for individuals with high self-esteem for both personal and corporate successes and failures (Schlenker, Soraci, & McCarthy, 1976).

We have suggested that self-esteem moderates reactions to threat in part because of the nature of self-regulation. Self-regulation may not be prompted when individuals with relatively low self-esteem receive negative social feedback, whereas the discrepancy between expectation and reality experienced when someone with moderate or high self-esteem receives such feedback is likely to prompt discrepancy-reducing strategies. Attributing failures to external sources plays a restorative role in self-esteem maintenance (Baumgardner et al., 1989), and so we expected that individuals with high trait self-esteem effectively self-regulate by blaming their failures on others while taking credit for their successes. In addition to using external attributions as a means of restoring or boosting state self-esteem, individuals with high self-esteem who can attribute failure to an external source may not encode that threat as a self-relevant experience, minimizing the need to incorporate that experience into their self-system. However, individuals with low self-esteem may not experience as much discrepancy to failure feedback and therefore may not react to the threat in a self-regulatory manner. Rather, they might respond to the negative feedback by assimilating the information into their already negative self-concept. In turn, this information might undermine their ability to develop positive self-feelings. Thus the conclusions that individuals make about the reasons for a failure or social slight influence the extent to which they can maintain a positive sense of self-worth both in the moment and over time.

The empirical literature on reactions to negative social feedback is quite large; elsewhere we report findings from a comprehensive quantitative synthesis of that literature (vanDellen, Hoyle, & Bradfield, 2009). Relevant to the current argument is a subset of studies with sufficient information to permit an analysis relevant to our arguments about self-regulation following negative social feedback as a function of trait self-esteem. We conducted a small meta-analysis that included studies if they

measured trait self-esteem, included a manipulation of threat (e.g., failure feedback, social exclusion) or a measurement of natural threat (e.g., change in self-esteem over time, performance on an exam), and provided enough detail that we could calculate an effect size at relatively low and high levels of trait self-esteem. Although the full meta-analysis included comparisons between individuals with high versus low self-esteem responding to threatening information about the self on a variety of variables, we focus here on the one variable most clearly indicative of self-regulation: attributions for the negative feedback. We computed separate effect sizes for individuals high in self-esteem and for individuals low in self-esteem, yielding 49 effect sizes from 25 independent studies in 20 articles.

We expressed effect size as Cohen's *d*, which is the standardized difference between two means (Cohen, 1988). In our case, the two means were from participants in a no-threat comparison condition and participants in a threat condition as described earlier. Typically, studies included a comparison group that received positive feedback, although some studies used a comparison group to which no feedback was given. Positive *d* values indicate that individuals in the threat condition demonstrated more self-regulation through self-protective attributions than individuals in the control condition; negative values of *d* indicate the opposite. Self-protection is operationally defined as attributions that, by discounting the negative feedback, reduce or eliminate the threat to, or inconsistency with, self-esteem. For instance, a positive value might indicate that individuals in the threat condition made more external attributions than those in the comparison condition, whereas negative values would indicate that individuals in the threat condition made more internal attributions than individuals in the comparison condition.

In our analyses, we focused on trait self-esteem as a moderator of self-protective attributions for negative feedback and social rejection. Our general expectations were that self-esteem would moderate effect sizes such that groups with high self-esteem would be more reactive to such threats. Because we focused on self-protective attributions, we expected that effect sizes would be positive and larger in magnitude for individuals high in trait self-esteem compared to their low self-esteem counterparts. That is, we expected individuals with high trait self-esteem to make more external attributions and fewer internal attributions following negative feedback compared to positive or no feedback than individuals with low trait self-esteem.

Overall, the results confirmed the self-serving bias, showing that individuals, regardless of level of trait self-esteem, were more likely to make external attributions after failure and internal attributions after success ($d = .33$). There was significant variability in this effect size across studies and, as we expected, level of trait self-esteem explained a significant portion of this variability. Individuals high in trait self-esteem evinced larger compensatory reactions to threat ($d = .50$) than individuals low in trait self-esteem ($d = .17$). Although trait self-esteem accounted for a significant portion of the variability in effect sizes, significant variability was evident among the effect sizes for both high and low self-esteem.

We next examined characteristics of the threat that might account for variability above and beyond variability accounted for by trait self-esteem. Several characteristics

of the self-esteem threats were of interest to us. First, we examined whether naturally occurring threats (e.g., performance on an exam) differed from experimentally manipulated threats (e.g., performance on a set of easy vs. difficult anagrams). Individuals may have been able to prepare for naturally occurring effects, mitigating the need to engage in self-regulation at the time. However, this distinction did not moderate effect sizes for either group, suggesting that negative feedback, even when feedback is expected and negative feedback is possible, tends to prompt self-regulation through attribution by individuals with high trait self-esteem.

We also examined whether the effect sizes within the high and low self-esteem sets varied according to whether the threat was administered in private conditions (i.e., only the participant knew about the poor performance or negative event) or in public conditions (i.e., the experimenter verbally delivered negative feedback). Although publicity of the negative feedback was inconsequential for the attributions of people with high self-esteem, it mattered for the attributions of people with low self-esteem, whose attributions were more self-protective when negative feedback was received in public ($d = .18$) compared to private ($d = .03$). One possible explanation for this pattern consistent with our self-regulation perspective is that the state of public self-awareness engendered by another person's awareness of their failure resulted in a comparison with the expectation of the other (as opposed to an internal standard), producing a need for discrepancy reduction not typical for people low in trait self-esteem (see Hoyle & Sowards, 1993, for a discussion of external standards).

We also examined whether type of threat influenced effect sizes for people with high and low self-esteem. We were particularly interested in whether the evidence of self-regulation in the form of self-serving attributions would vary according to whether feedback concerned academic performance or social competence. Although there is reason to believe that state self-esteem would react more strongly to negative feedback about social competence compared to academic performance (Leary et al., 1995; Schlenker, Weigold, & Hallam, 1990), there is emerging evidence that feedback in domains that are not expressly social, such as academic performance, invokes concerns about relational value (vanDellen et al., in press). The findings were consistent with this perspective, showing no evidence of differential impact for academic and social feedback.

Next we turned to variation in the type of attributions for negative feedback that may have moderated the effect sizes for people with high and low self-esteem. These included whether the responses were social (e.g., blaming failure on the experimenters' incompetence) versus nonsocial (e.g., blaming failure on the computer program) in nature and whether the attributional response concerned the self or someone or something outside the self. Whether the target of attributions was social or nonsocial moderated effect sizes for both high and low self-esteem people. Regardless of level of trait self-esteem, people displayed greater compensatory reactions when the responses were social in nature ($d$s = .25 and .87 for low and high self-esteem, respectively) than if they were nonsocial in nature ($d$s = .13 and .44). These data suggest that using social figures as scapegoats for failure may be an easier or more effective self-regulatory strategy than using other targets as excuses.

We then examined whether the attributions for failure were directed at the self or targets other than the self. This variable significantly moderated effect sizes both for individuals low and high in self-esteem. The effect was particularly strong for those with low self-esteem, who showed no tendency to make attributions to self following failure ($d = -.03$). In contrast, when given an opportunity to make external attributions for failure, individuals with low self-esteem displayed compensatory reactions by attributing their poor performance to targets other than self ($d = .41$). Similarly, individuals with high self-esteem evidenced the most compensatory reactions when provided with opportunities to make external attributions ($d = .60$); however, unlike their low self-esteem counterparts, they tended to compensate when provided with opportunities to make attributions to self as well ($d = .38$). In those studies that offered the option to attribute to both self and factors other than the self, people with low self-esteem showed no evidence of self-regulation through attribution ($d = .01$), whereas those with high self-esteem clearly used attribution to manage the sting of failure feedback ($d = .56$). Although there is some evidence of people with relatively low self-esteem using attributions to manage self-esteem threat, the evidence largely favors our view that the state self-esteem of people with high trait self-esteem is most vulnerable and therefore in greater need of maintenance through self-regulation.

We noted earlier that research participants classified as having low self-esteem are low only in a relative sense. Indeed, it is not uncommon for the median that divides a sample into low and high self-esteem groups to be around 4.0 on a 1-to-5 scale. Thus "low" self-esteem groups routinely include people who view themselves quite positively, perhaps explaining why some of the findings in our meta-analysis seem to suggest that, contrary to our prediction, people with low self-esteem respond to self-esteem threats in ways that suggest a motivation to reduce discrepancy between expectation and reality. There was sufficient variability in the way the trait self-esteem variable was handled in the studies in our meta-analysis that we were able to examine this possibility that people classified as low in self-esteem seem to self-regulate in the face of self-esteem threats because, in many instances, their self-esteem is not low at all. To evaluate this possibility, we conducted a moderator analysis in which we compared effect sizes for people with low and high self-esteem as a function of whether self-esteem was treated as a continuous variable, a categorical variable based on a median split, or a categorical variable based on extreme groups (e.g., low self-esteem defined as falling in the low quarter or third of the distribution). If our reasoning is correct, then we should see some evidence of self-regulation among people with low self-esteem when "low" is defined as falling below the median, but no evidence of self-regulation when the cutoff or estimated mean is, in fact, low on the measure of self-esteem.

This analysis produced a strong effect of classification strategy for both low and high self-esteem. The strongest test of our prediction would be the relative effect sizes for people with low and high self-esteem as defined by extreme groups. The results strongly support the prediction, with those with high self-esteem showing a strong effect for self-protective attributions after receiving negative feedback ($d = .76$) but those with low self-esteem showing no effect ($d = -.19$). Not surprisingly, given our

concern that median splits produce a low self-esteem group that includes many people with relatively positive self-views, there is a significant attribution effect for both lows ($d = .33$) and highs ($d = .44$) when classification is accomplished by median split. The pattern for studies in which self-esteem was treated as a continuous variable mirrors the pattern for extreme groups ($d$s = −.04 and .52 for low and high, respectively), because estimated means used to estimate attribution scores at low and high levels of self-esteem are close to the points used to define extreme groups. It appears then that the use of self-protective attributions as a means of regulating state self-esteem when it is threatened is more likely to occur among individuals with moderate and high levels of trait self-esteem, and unlikely to occur among individuals with truly low levels of trait self-esteem.

## Contingent High Self-Esteem and Threats to Belonging

The results of the meta-analysis heightened our interest in how individuals with high trait self-esteem manage self-esteem threats. Although self-protective attributions are an effective cognitive mechanism by which individuals might self-regulate after receiving such threats, we wondered whether individuals might also regulate their state self-esteem using affective strategies. We have been particularly interested in the threat of social exclusion, because it affects people with high self-esteem whose feelings of worth are staked on their inclusionary status; that is, their self-esteem rises and falls as they perceive change in the extent to which they are socially included or excluded. We reasoned that people with high self-esteem whose self-esteem is contingent on their inclusionary status might react to social exclusion in one of two ways. The most straightforward prediction, which we term the vulnerability hypothesis, is that they would report more negative state affect and lower state self-esteem than people with high self-esteem whose self-esteem is not contingent on inclusionary status or who do not experience social exclusion. This prediction is consistent with a basic tenet of the contingencies of worth model (Crocker & Wolfe, 2001). Research inspired by this model has demonstrated that negative feedback in a particular domain (e.g., academics, physical appearance) has a stronger deleterious effect on the state self-esteem of individuals whose self-esteem is contingent in that domain (e.g., Crocker, Karpinski, Quinn, & Chase, 2003; Crocker, Sommers, & Luhtanen, 2002). A less intuitive prediction is the defensive compensation hypothesis, which posits that people with high self-esteem whose self-esteem is contingent on inclusionary status will show *less* negative state affect and *higher* state self-esteem in response to social exclusion than people with self-esteem whose self-esteem is not contingent on inclusion or who are not excluded. This prediction is consistent with the observation that, after a public failure, people with high self-esteem who are not otherwise allowed to repair the damage evince a compensatory increase in state self-esteem (Greenberg & Pyszczynski, 1985). The reason public, but not private, failures produce this reaction is that public evaluations

engender conditional self-regard because they have potential implications for acceptance or rejection by observers. This situated concern is not unlike the more enduring concern of individuals whose self-esteem is more generally tied to their inclusionary status.

For this work we developed a brief self-report measure of contingency of self-esteem on inclusionary status (Hoyle, Robinson, Park, Pasatta, & Duvall, 2003). In this measure, respondents are presented with a series of statements that describe a concrete instance of social inclusion or exclusion (e.g., "You are invited to a party." "You find yourself alone on a major holiday"). After each statement, respondents are asked to indicate how much, if at all, their feelings would change in response to the event described in the statement. Deviation from the *no change* midpoint indicates contingency of self-esteem on the event, and the sum of absolute values across the statements reflects overall contingency of self-esteem on inclusionary status.

Prior to arriving for the experiments, participants had completed our measure of contingency on inclusionary status and a standard measure of global trait self-esteem. We manipulated social exclusion using a writing exercise in which participants wrote about an event that left them feeling either "left out of a group" or as if they "belonged to a group." In order to facilitate participants' memory, we asked for various details about the event (e.g., where it took place, who was there). Participation in the experiments concluded with participants' completion of measures of state affect, self-esteem, and/or belongingness.

In the initial experiment, we compared postmanipulation means on state negative affect as a function of level of trait self-esteem, level of contingency of self-esteem on inclusionary status, inclusionary status, and their interaction. We found a significant three-way interaction attributable to different reactions to exclusion among individuals with high trait self-esteem and high contingency on inclusionary status. Whereas all other individuals (e.g., those with low self-esteem and those with high, but less contingent, self-worth) reported more negative affect after writing about exclusion than after writing about an experience of inclusion, individuals with highly contingent high trait self-esteem reported *less* negative affect after exclusion than after inclusion. These initial results provided strong support for the defensive compensation hypothesis.

We inferred that this reaction on the part of individuals with high trait self-esteem whose self-esteem is highly contingent was a self-regulatory strategy aimed at counteracting a challenge to the integrity of the self (Steele et al., 1993). In a follow-up study we replicated the basic design but added two key outcomes to our measures of state affect. We added a measure of state self-esteem in order to ensure that the effect was indicative of self-regulation rather than emotion regulation. We also included a measure of implicit self-esteem. We expected to replicate the defensive compensation effect for explicit state self-esteem, but to find a pattern more consistent with the vulnerability hypothesis for implicit self-esteem, which is assumed to be more difficult for individuals to both access and control (Greenwald & Banaji, 1995). The results of this experiment were mixed and surprising. We found no effect on implicit self-esteem. However, we found evidence for the vulnerability hypothesis, not the

defensive compensation hypothesis, with respect to explicit state self-esteem and negative affect. Specifically, social exclusion did not influence the state self-esteem and negative affect for people with low trait self-esteem or for people high in trait self-esteem but low in contingency on inclusionary status. For people with highly contingent high self-esteem, however, negative affect was significantly higher and state self-esteem significantly lower following recall of an instance of exclusion compared to recalling an instance of inclusion.

The seemingly contradictory findings from these two experiments led us to consider possible moderators that would explain why under certain conditions we observe vulnerability and under other conditions we observe defensive compensation following social exclusion for individuals with high trait self-esteem whose self-esteem is contingent on inclusionary status. Because the primary difference between the two experiments was the assessment of implicit self-esteem, we suspected that this assessment might offer clues regarding the moderator variable. In the second experiment, we used the Self-Esteem Implicit Association Test (Greenwald & Farnham, 2000) to measure implicit self-esteem. This measure was inserted immediately following the writing exercise and immediately prior to the measures of state self-esteem and affect. It is an involving measure that, in our implementation, took participants between 10 and 15 minutes to complete. We reasoned that, by inserting this task prior to assessment of the dependent variables, we had disrupted the typical self-regulation of highly contingent people with high self-esteem. Unable to compensate for the threat of social exclusion by inflating their self-ratings, they evinced the pattern of vulnerability predicted by the contingencies of worth model.

We designed a third experiment to evaluate our reasoning. In this experiment, we included only participants who, based on a preliminary assessment, were high in trait self-esteem and high in contingency on inclusionary status. Furthermore, all participants recalled an instance of social exclusion. We randomized participants to one of three conditions. In one condition, consistent with our first experiment, participants completed the writing exercise recalling an instance of exclusion and then completed the dependent measures. In a second condition, after participants completed the writing exercise, they participated in an ego-depletion task (challenging serial subtractions) designed specifically to disrupt self-regulation (Baumeister, Bratslavsky, Muraven, & Tice, 1998). In order to evaluate whether we had indeed disrupted self-regulation in our second experiment as opposed to simply distracting participants, we included a third condition in which participants were given the amount of time required by the ego-depletion task to look through magazines. The results provided strong support for our assumption that defensive compensation is a self-regulatory strategy used by highly contingent people with high self-esteem in the face of a threat to self-esteem. Individuals in the ego-depletion condition showed lower state self-esteem and higher negative affect than individuals in the immediate and distraction groups, who did not differ on the outcomes.

On the basis of findings from these experiments, we posit that individuals with high self-esteem whose self-esteem is highly contingent are both highly vulnerable to

threats to self-esteem and highly capable of managing those threats through affective strategies when their capacity for self-regulation is not disrupted. The findings also lead us to two additional inferences. Our social exclusion manipulation had no discernible effect on people with high self-esteem who were low in contingency of self-esteem on inclusionary status. This pattern is consistent with the contingencies of worth model (Crocker & Wolfe, 2001) and underscores the emerging assumption that a full understanding of self-esteem processes requires moving beyond simply distinguishing people in terms of their level of self-esteem (Kernis et al., 1993). Our threat manipulation also produced no effect on the state self-esteem or affect of people with low self-esteem. Although one must exercise caution in interpreting null findings, this pattern would support consistency models of self-esteem that predict no need for self-regulation in the face of mild social exclusion for individual low in trait self-esteem because of the consistency of this information with their view of themselves (e.g., Swann, Griffin, Predmore, & Gaines, 1987). This finding also is consistent with one tenet of the sociometer model, which suggests that low self-esteem is nothing more than an indicator of the general perception of low relational value (Leary et al., 1995). Following this logic, our manipulation of social exclusion did not stimulate self-regulation by people with low self-esteem because it was simply an expression of their trait self-esteem. A final implication of our work is that, consistent with the contingencies of worth model, variability in the strength of the fundamental need to belong explains variability in responding to threats to relational value by individuals high in trait self-esteem.

## Summary and Conclusions

We have argued that the degree to which people are motivated to self-regulate when they receive negative feedback in the form of poor performance evaluations or social rejection is a function of their trait self-esteem. When trait self-esteem is low, in an absolute sense, negative feedback is not inconsistent with individuals' views of themselves, and therefore does not produce the expectation–reality discrepancy that motivates self-regulation. When trait self-esteem is high, positive feedback is expected; thus the receipt of negative feedback produces a discrepancy between expectation and reality. The tangible evidence of this discrepancy is a temporary reduction in state self-esteem, sometimes countered by attributional discounting or an immediate compensatory inflation of state self-esteem. The goal, therefore, of self-regulation by people high in trait self-esteem is the restoration of state self-esteem to a level commensurate with trait self-esteem through cognitive and affective strategies.

We also have argued that, because of the uncertainty of social life, there is a chance that, in any specific situation, people with high self-esteem will be faced with information that calls into question their high opinion of themselves. We used event-contingent experience sampling to identify situations in which such questions

might arise. We found that state self-esteem is most volatile in those social situations that are least predictable and controllable. The fact that social interactions in unfamiliar settings with unfamiliar others are inevitable ensures that people with high trait self-esteem will regularly experience shifts in state self-esteem that prompt self-regulation.

Because such self-esteem threats likely occur with some frequency, people with high self-esteem have developed self-regulatory strategies that typically afford relatively quick recovery from such setbacks. Findings from a portion of our meta-analysis of results from research on reactions to self-esteem threats indicated that people with high self-esteem are particularly adept at using attributional strategies that allow them to discount negative feedback by discrediting either the feedback itself or the source of the feedback (Baumgardner et al., 1989). Findings from a series of experimental studies that differentiated participants on both trait self-esteem and the basis of their self-esteem showed that, when individuals with high self-esteem are threatened in the area on which their self-esteem is most strongly staked, they self-regulate using affective strategies that initially overcompensate for the blow to state self-esteem. These are likely only two of a number of cognitive, affective, and behavioral strategies by which individuals with high trait self-esteem regulate their state self-esteem while navigating the stormy waters of everyday social life.

Although strategies such as those we have illustrated typically are effective for managing state, and ultimately trait, self-esteem, they may have the undesirable consequence of convincing an individual with high self-esteem that he or she has no weaknesses or faults that need attention (McCrea, 2008). Furthermore, rigid use of discounting might lead individuals to avoid domains in which they might receive negative feedback, limiting the kinds of activities they might be able to enjoy (Crocker & Park, 2004). Longer-term discrepancy-reduction strategies such as self-improvement or tempering of unrealistically high self-appraisals serve both self-regulatory and performance goals. Balancing high self-esteem with self-compassion might also allow people with high trait self-esteem to protect their self-feelings while benefiting from all they learn about themselves, both positive and negative (Leary, Tate, Adams, Allen, & Hancock, 2007).

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# 20

# *Individual Differences in Approach and Avoidance*

## Behavioral Activation/Inhibition and Regulatory Focus as Distinct Levels of Analysis

**Timothy J. Strauman and Wilkie A. Wilson**

> *Man is a goal-seeking animal. His life only has meaning if he is reaching out and striving for his goals.*
>
> (Aristotle, *Nicomachean Ethics*)

Philosophers and scientists have long conceptualized differences among people in terms of the kinds of goals they pursue and their characteristic ways of pursuing them. Indeed, the history of psychology includes a succession of grand theories intended to account for the purposive nature of human behavior (Bandura, 2006). In an influential review, Austin and Vancouver (1996) defined goals as *internal representations of desired states* and identified approach and avoidance goals as among the most important classes of goals. With apologies for the sexist language, we find Aristotle's observation intriguing because it contains much of the since-accumulated wisdom of behavioral science and neuroscience research on motivation: Human behavior is goal-seeking in nature; we share much, but not all, of our motivational "machinery" with other animals; behavior can be characterized according to its purpose, particularly with reference to the individual's beliefs about desired and undesired end states. To these implications we would add: People vary in their characteristic orientations toward goals, presumably because of both "nature" (e.g., inborn tendencies) and "nurture" (e.g., socialization) as well as the ongoing and complex interplay between them. The purpose of this chapter is to explore similarities and differences between two theoretical models (one broad and the other more specific) for individual differences in approach and avoidance behaviors.

Two levels of analysis currently dominate the study of individual differences in approach and avoidance, namely the biobehavioral and social-cognitive perspectives (Ryan, Kuhl, & Deci, 1997). The *biobehavioral* level emphasizes early-appearing, stable individual differences derived from underlying and at least partly inborn biological characteristics (McCrae & Costa, 1996). Most biobehavioral theories of motivation postulate brain–behavior systems that underlie approach and avoidance tendencies (Carver & White, 1994; Depue & Collins, 1999; Fowles, 1994; Watson, Wiese, Vaidya, & Tellegen, 1999). Those systems are hypothesized to have emerged over the course of evolution, and to modulate responsiveness to reward and threat cues as well as approach and avoidance behaviors (Clark, Watson, & Mineka, 1994).

The *social-cognitive* perspective (e.g., Bandura, 1986; Mischel, 1990) emphasizes knowledge structures that function in reciprocal interaction with the social environment to determine goal pursuit (Cervone, 2000). A number of social-cognitive models for individual differences in approach and avoidance have appeared (e.g., Carver & Scheier, 2000; Elliot & Thrash, 2002). Although there are important distinctions among them, the major current social-cognitive models of approach and avoidance are similar in terms of the postulated primary causal status for knowledge representations (Elliot, 2008). In one prominent example, Higgins (1997) proposed a theory of *regulatory focus* that postulated motivational systems for maximizing positive outcomes (*promotion*) and minimizing negative outcomes (*prevention*). Individual differences in regulatory focus are stable over time and predict approach–avoidance goal accessibility as well as strategies and means for pursuing them (Strauman, 1996).

Despite the extensive literatures on individual differences in biobehavioral and social-cognitive systems mediating approach and avoidance, it remains unclear whether the two families of theories ultimately refer to common underlying mechanisms or to sources of individual differences that are conceptually as well as functionally distinct (Block, 1995; Carver, Sutton, & Scheier, 2000; Caspi, 1998; Cervone, 2000; Depue, Luciana, Arbisi, Collins, & Leon, 1994; Elliot & Thrash, 2002; Higgins et al., 2001). In this chapter, we will attempt to provide a conceptual framework for understanding the shared and distinct characteristics of these two sets of systems. We will use regulatory focus theory (RFT) as an exemplar of the social-cognitive tradition, with the proviso that most of the comparisons we draw between biobehavioral models and RFT would be valid for any of the other prominent social-cognitive theories. Whereas other reviews of psychological models for approach and avoidance (e.g., Scholer & Higgins, 2008) have proposed distinctions between these two levels of analysis in terms of systems, strategies, and tactics underlying approach and avoidance, our analysis will center upon *distinguishing between biobehavioral and social-cognitive systems for approach and avoidance in terms of psychological function as well as underlying neurobiology*.

On the basis of this analysis, we will propose that the two sets of systems are distinguishable by critical differences in how they function and how they are activated. The functional distinction we propose, drawing upon previous analyses, is a distinction between spatiotemporal and strategic organization of behavior. The activation-related

distinction we propose, also based upon previous analyses, is that, fundamentally, the biobehavioral systems are activated by an evolutionarily determined set of external stimuli, whereas the social-cognitive systems are activated by heightened accessibility of a personal goal representation (where accessibility is defined as the likelihood that a stored unit of knowledge will be used in ongoing information processing; see Higgins & King, 1981). We will conclude that the biobehavioral and social-cognitive mechanisms underlying goal-directed behavior may best be conceptualized as distinct in terms of developmental origins, function, and brain correlates, but are clearly capable of influencing (and even overriding) each other and ultimately are not yet completely understood.

## Systems for Approach and Avoidance: Conceptual Issues

What do we mean by the term *system* within a discussion of the psychology of approach and avoidance? The concept of goal-directed behavior implies activation of the organism by some triggering stimulus or event (which could be environmental or internal) as well as a directed behavioral output that either moves the organism closer to the goal (in a spatiotemporal and/or strategic sense) or inhibits such movement. From this perspective, a system could represent a collection of psychological processes, as well as the neurobiological processes associated with them (as measured via functional imaging or more invasive techniques). The search for neurobiological substrates of goal-directed behavior involves defining the neural structure and processes that (a) attach sufficient importance (salience) to an external or internal stimulus that behavior is initiated (or inhibited), and (b) direct the behavior in reference to the goal (Berridge, 2004; Kalivas & Volkow, 2005).

Within biobehavioral research, the notion of a *brain–behavior system* represents a construct denoting characteristic patterns of activity in central nervous system (CNS) structures associated with behavioral, motivational, and affective responses to specific classes of stimuli (Fowles, 1994; Kling & Steklis, 1976; LeDoux, 2000). It is important to emphasize that, as constructs, these systems represent abstractions rather than anatomically delimited neural structures; that is, behavioral scientists and neuroscientists have operationalized brain–behavior systems through a combination of function and anatomical criteria (Watson et al., 1999). Given the as yet limited state of knowledge regarding how brain processes produce mental processes, we emphasize the importance of understanding these systems as constructs. We also stress the need to bring theory to bear on understanding how they function psychologically as well as how they are instantiated in the brain, and the importance of recognizing that these are two different questions.

As will be discussed below, the most widely conceptualized brain–behavior systems originated from the animal research literature, and thus were not originally construed as incorporating higher order cognitive processes. Although the brain–behavior system

construct has had a major impact on theories of motivation and emotion, it cannot provide a sufficient explanation for many of the more complex, socially mediated manifestations of human goal pursuit (Tomarken & Keener, 1998). To account for such phenomena, systems need to incorporate the psychological processes associated with socially embedded self-regulation—and particularly the goals around which people organize their activities and the self-evaluative and meaning-making processes associated with goal pursuit (Elliot, 2008). In our view, the similarities and distinctions between brain systems that instantiate lower order versus higher order cognitive processes, particularly with reference to goal pursuit, are only beginning to be conceptualized.

For example, noting the aforementioned general limitation of biobehavioral systems hypothesized to underlie individual differences in approach and avoidance, Strauman (2002) proposed the integrative concept of a "self/brain/behavior system," a hypothetical construct encompassing human approach and avoidance behaviors both narrowly and broadly conceived. We will take a different perspective in this chapter, one that emphasizes similarities and distinctions between system constructs already linked with empirical research, but that also identifies unanswered research questions: both "bottom-up" (e.g., how do individual differences in reward or fear sensitivity influence interpersonal goal pursuit?) and "top-down" (e.g., under what circumstances do higher-order cognitive processes, such as those hypothesized for self-regulation, override the impulses of reward and fear neurocircuitry and vice versa?).

Our own research (in psychology and neuropharmacology, respectively) suggests to us that systems constructs are likely to be organized in ways that correspond to specific levels of analysis (e.g., molecular, neural network, biobehavioral, interpersonal). Most systems models have been derived primarily from research within a particular discipline, for example, physiological psychology, pharmacology, cognitive neuroscience, or personality psychology (Rolls, 2000). Both the levels of analysis at which they are organized and the research literatures to which they refer, in turn, inevitably carry advantages as well as disadvantages in providing an account of individual differences in human behavior. Our discussion will focus on what might be termed the *range of convenience* of the systems concepts we review, as well as on how a well-articulated perspective on the similarities and distinctions across such concepts can help to generate new knowledge about human goal pursuit.

Given the highly developed nature of the literatures to which we will refer, is there really new ground to be broken? We suggest that a clear articulation of approach–avoidance systems constructs can set the stage for the emergence of a more comprehensive perspective on how individuals characteristically pursue goals and how different kinds of approach–avoidance systems interact. For example, consider the idea that human social-psychological capabilities evolved in response to an increasingly complex social environment (Leary, 2004). Within this scenario, one likely evolutionary pressure would be for humans to acquire the capacity to monitor their individual status in reference to others upon whom they depend for survival (Posner & Rothbart, 2000). And indeed, developmental researchers have established that children must learn to behave in ways that maintain the nurturance and security they require from

caregivers (e.g., Kochanska, 1995). In order for humans to survive and thrive, they must be not only capable of effective behavior in the face of survival-relevant stimuli (after all, we are biological organisms); they also must be capable of self-representation and self-evaluation within the social context, and the representational, monitoring, and evaluative functions must be integral parts of the larger system for regulating goal pursuit (Mischel, 2004).

If the perspective we are taking here is valid, then approach–avoidance systems hypothesized to account for human individual differences will include systems for behavioral tendencies shared by humans and nonhuman organisms as well as systems for behavioral tendencies that (to the best of our knowledge) only humans manifest in fully articulated form. Most animals have a relatively limited repertoire of approach goals and a limited set of strategies for achieving those goals. In contrast, although humans are born with sensitivities to the same survival-relevant stimuli as their nonhuman primate cousins (Gray, 1990), the kinds of positive outcomes that humans pursue can be as animal-like as sating one's hunger, or as uniquely human as seeking world peace. For many of the goals that people pursue, there is no literal or spatiotemporal "moving toward" (in the physical sense); rather, the strategies people use may instantiate a different sense of approach, that is, "setting about" or "bringing about" (in a conceptual or symbolic sense). Human goal pursuit often takes the form of strategies and tactics that have no inherent or necessary logical connection to "physical approach," but rather are more accurately conceptualized as conceptually "making things happen" (Carver & Scheier, 1998). Similarly, both animals and humans seek to avoid negative outcomes, but for humans the outcomes to be avoided range from spatiotemporally immediate circumstances such as being hit by a car to abstract, personal circumstances like violating one's moral principles.

We urge the reader to keep in mind that constructs operationalized at different levels imply different types of measurement (which, in turn, originate from different disciplines), but do not imply a one-directional causal hierarchy or necessitate a reductionistic view of human behavior (Cacioppo, Berntson, Sheridan, & McClintock, 2000). Accordingly, we use the term *underlie* simply to denote the logical relation between the disciplines that correspond to levels of analysis, not in a strict causal sense (as in "the brain *causes* people to behave in particular ways"). Miller and Keller (2000) recommended the term *implement* instead (e.g., psychological functions are implemented in neural systems) and we also find that terminology to be appealing. Miller and Keller likewise offered the following observation: "Fundamentally psychological concepts require fundamentally psychological explanations" (2000, p. 215). That is, knowledge about biology can inform psychological explanations, but does not supplant them, any more than knowledge about psychology could replace biological explanations of relevant phenomena. Armed with these caveats, we can move ahead to consider the psychological functions and neurophysiological correlates of systems for approach and avoidance.

In considering the sections that follow, the reader may find it useful to keep in mind two basic principles by which to conceptualize what a *system* construct represents. First,

the psychological processes within each system develop and operate in relation to each other rather than in isolation (Watson et al., 1999). In the case of approach and avoidance behaviors, psychological processes such as emotion, motivation, and cognition reflect the goal-oriented activity of the system as a whole. Second, a system operates at three distinct levels in the instantiation of goal pursuit (Matthews et al., 2000). The *neurophysiological* level refers to the operation of CNS structures which support processes such as motivation, emotion, and self-regulatory cognition. In contrast, the *cognitive* level refers to information processing or computational events that are supported by the CNS; this level is more accurately conceptualized as symbolic operations rather than as brain activity. And distinct from the neurophysiological and cognitive levels, the *knowledge* level refers to individuals' goals, intentions, and beliefs about themselves in relation to the social world.

One final caveat: It is clear that environmental or internal factors that directly alter neurobiological processes will have profound consequences for behavior. One obvious example is substance use. If the brain systems that instantiate anger are stimulated by ethanol intake while the regions that instantiate effective self-regulation are suppressed, the resulting goal activation and goal pursuit behavior will be different than if there were no ethanol "on board." The dependence of psychological processes on neurobiological systems should not be taken for granted in discussions of the psychology of goal pursuit. Neither should the importance of individual differences in the function of those neurobiological systems (or, for instance, in their sensitivity to ethanol) be overlooked.

## Biobehavioral Systems for Approach and Avoidance: The Behavioral Activation and Inhibition Systems

A consensus has emerged regarding the biological systems (brain–behavior systems or, from the animal and medical literature, reward and fear systems) underlying approach and avoidance motivation and associated goal-directed behaviors (Carver, 2006; Gable, Reis, & Elliot, 2003). These constructs originated in the animal literature but have been assimilated into models of human temperament, motivation, and affect (Watson et al., 1999). The two systems normally operate in a mutually inhibitory manner (Carver & White, 1994; Clark et al., 1994; Gray, 1990) and have been widely interpreted as neuropsychological constructs that relate behavior regulation to personality as well as psychopathology (Cloninger, 1987; Fowles, 1988).

The *behavioral activation system* (BAS; Fowles, 1988), also called the behavioral approach system, the behavioral facilitation system, or the reward system (Depue & Iacono, 1989; Gray, 1990) is hypothesized to underlie the engagement of behavior, approach motivation, and behavior in the presence of cues for reward. According to Gray (1990), the key CNS components of the BAS are the basal ganglia (the dorsal and ventral striatum, and dorsal and ventral pallidum), the dopaminergic fibers that

ascend from the mesencephalon to innervate the basal ganglia, the thalamic nuclei closely linked to the basal ganglia, and the neocortical areas (motor, sensorimotor, and prefrontal cortex) closely linked to the basal ganglia. Motivational states related to approach or reward, energetic arousal, and positive affect, as well as personality traits such as extraversion, impulsivity, novelty seeking, and positive affectivity, have all been linked to the BAS (Berridge and Kringelbach, 2008; Revelle, 1995).

The *behavioral inhibition system* (BIS; Fowles, 1988; Gray, 1982), also referred to as the fear system, is a brain–behavior system hypothesized to underlie avoidance motivation and the inhibition of behavior in the presence of cues for threat. Key CNS components of the BIS include the septohippocampal system, its monoaminergic afferents from the brainstem and its neocortical projections to the frontal lobe, and the amygdala (Gray, 1994; Misslin, 2003). The BIS is postulated to underlie sensitivity to cues for punishment, nonreward, and novelty, as well as to innate fear stimuli. Activation of the BIS is postulated to lead to behavioral inhibition, an increment in tense arousal, and increased attention in order to avoid negative or painful outcomes (Revelle, 1995). Neuroticism is understood to reflect chronic levels of BIS activity, and negative affect and state anxiety are presumed state markers of BIS activation (Arnett & Newman, 2000).

There is a range of opinions in the literature concerning the nature and assessment of individual differences in BAS and BIS strength. There have been a number of scales used to measure individual differences in behavioral activation and inhibition as well as related constructs such as reward sensitivity or harm avoidance (see John and Gross, 2007, for a review). Most of the literature on individual differences in BAS and BIS strength is based on questionnaire responses; although a few studies have measured acute activation of the BAS and BIS using physiological assessment techniques, the stability and cross-situational consistency of such responses is poorly understood (Fowles, 2001). In contrast, the construct validity of individual differences in BAS and BIS strength as measured via self-report is better established, albeit potentially at the cost of greater conceptual distance from the underlying neurophysiology (Carver & White, 1994; Gable et al., 2003; MacAndrew & Steele, 1991; Watson et al., 1999). The personality dimensions of extraversion and neuroticism are conceptualized as behavioral manifestations of individual differences in BAS and BIS strength respectively. Questionnaire measurement of individual differences in BAS and BIS strength appears to be valid and reliable even after controlling for response biases common in self-report instruments (Elliot & Thrash, 2002). However, important questions remain regarding the precise mechanisms by which such questionnaire measurements link with underlying differences in neurobiology (Depue & Collins, 1999). We will return to those questions at the conclusion of the chapter.

The BAS, which is primarily guided by the nucleus accumbens and limbic centers, facilitates the active search for reward as well as goal-seeking behavior once a reward stimulus is detected; activation of these centers transforms motivational drives into behavioral actions (Panksepp, 1998). The primary reward-focused motivational circuitry, as described by Chambers and colleagues (2003), consists of the ventral/medial prefrontal

cortex (PFC) and the nucleus accumbens. This neurocircuitry has direct influence on motor output, and activation of this pathway (consisting of cortical-striatal-thalamic-cortical loops) results in either activation (go) or inhibition (no go) of behaviors associated with specific incentives. The BAS is influenced by sensory, contextual, and affective information arriving via hippocampal–amygdalar connections. Changes in activity of these structures influences reward neurocircuitry, and thus the intensity and direction of incentive-directed behaviors; hence the tendency for this system to be referred to in the medical and neurobiological literatures as the *reward system*.

The biological mechanisms of the BAS are being intensively explored, driven, in part, by the search for underlying mechanisms of addiction to drugs. Because addictive compounds (and behaviors) increase the level of the neurotransmitter dopamine (DA), the role of DA in BAS function has been the focus of intensive and extensive investigation. Once thought to be the prime mediator of pleasure from both natural and pharmacological rewards, it is now seen to have the more specialized role of encoding "incentive salience" to cues and producing "wanting" of a rewarding target rather than "liking" (Berridge, 2007). In addition, it clearly promotes goal-related behavior in response to anticipated reward. The striatal dopamine network projects to areas of the lateral and orbital regions of the prefrontal cortex (Rolls, 2000). For example, DA agonists have been shown to enhance sexual motivation and exploratory behavior (Everitt, 1983; Kalivas, 1993, LeMoal & Simon, 1991). The ventral tegmental area provides the primary dopaminergic input to the nucleus accumbens, translating motivational drives to action much like a "go" signal (Panksepp, 1998; Salamone, Correa, Farrar, & Mingote, 2007). Natural rewards (e.g., food and sex), as well as several drugs of abuse, increase the dopaminergic signaling in this pathway, thus mobilizing the body for reward-seeking. In fact, pharmacological activation of dopaminergic systems modulated by drugs of addiction strongly resembles the motivational activation resulting from encountering novelty in the environment (Bardo, Donohew, & Harrington, 1996).

The BIS, which is primarily mediated by the amygdala and PFC, functions to guide behaviors in a harm-reducing manner. Gray (e.g., 1982) and others conceptualized BIS as an attentional system that functions to interrupt ongoing behavior to facilitate the processing of cues for punishment and nonreward. The *amygdala* has a significant influence on primary motivation circuitry and has well-characterized reciprocal connections with the PFC. Recent work indicates that the amygdala and cortical circuitry function as an integrated system to influence decision making (Baxter, Parker, & Lindner, 2000; Seymour and Dolan, 2008). Humans with bilateral damage to either the amygdala or the PFC are unable to use relevant information about positive and negative outcomes to accurately appraise risk and select appropriate behavior (Bechara, Damasio, & Damasio, 1999), and rats and monkeys with similar lesions show an inability to change behaviors to varying values of outcomes (Gallagher, McMahan, & Schoenbaum, 1999). Winstanley, Dalley, and Theobald (2004) showed that lesions of the amygdala result in impulsive decisions in a delayed reinforcement paradigm. The amygdala is critically involved in responses to aversive stimuli (LeDoux, 2000) and can function as a behavioral "brake" (Zald, 2003).

Returning to the Aristotelian perspective that people are goal-seeking animals, it is interesting to consider the experiential aspects of approach–avoidance systems. For example, what do BAS and BIS activation feel like? The emotional consequences of activating the BAS or BIS can range from imperceptible to profound (LeDoux, 2000). In informal conversations, we often illustrate the activation of the BAS by asking people to imagine being at a party and just talking with friends. Then we have them consider what happens when someone remarkably attractive to them enters the room. They can clearly appreciate several components of BAS activation: for example, a shift in attention, because they notice the attractive person, and unless they are remarkably self-controlled, they focus on that person and at least momentarily ignore their friends. We then have them consider what happens if the individual affirms them by making social contact. Almost certainly they will feel a rush of stimulation, which neurophysiologists interpret as activation of BAS as the individual anticipates a rewarding encounter and the system releases dopamine (Berridge, 2007). They may find that they also experience a corresponding suppression of BIS and take a risk in striking up a conversation even if they normally would not. As the social contact progresses and they are clearly affirmed by this person, they begin to feel further stimulation and perhaps develop a sense of competency and power. If the relationship develops further, they may experience euphoria, and almost certainly will embed cues and emotional memories to repeat the experience.

Similarly, we talk about the experience of BIS activation by asking people to imagine that someone has just entered the room with an automatic weapon. The sympathetic nervous system will engage, with heart rate, blood pressure, and respiration increasing as the amygdala discharges, this time to prepare for fight or flight (LeDoux, 2000). They will experience remarkable tension, perhaps momentary paralysis, suppression of pain responses, and an impending sense of doom. If the individual begins firing the weapon, they may become active to seek shelter or escape from the situation. They will be left with powerful negative emotional memories and cues to help them avoid such situations in the future.

But just as surely as those prototypical situations are likely to result in BAS or BIS activation, there are broad individual differences in such activation. What is the current state of knowledge regarding the influence of individual differences in BAS and BIS on approach–avoidance and goal pursuit? In our view, although these two systems constructs are now cornerstones of personality psychology as well as behavioral neurophysiology and neuropharmacology, there is still much to be clarified. In particular, we see at least three as yet unresolved issues particularly relevant to this handbook. First, how do characteristic patterns of brain function—understood at the level of neurotransmitters, for instance—relate to the cross-situational consistencies in approach and avoidance tendencies assessed by questionnaire measures of BAS/BIS strength (e.g., Carver & White, 1994)? Researchers are beginning to examine and quantify such covariation (as well as the conditions under which it is maximized or minimized), but the task is an enormous one (Depue & Collins, 1999) and the conceptual distance between brain and questionnaire response is considerable.

Second, how do BAS and BIS relate to, and interact with, other sources of behavioral control? For example, a number of theoretical models implicate the prefrontal cortex as a source of "top-down" or intentional control of goal pursuit, but the neural dynamics of such control—and the neural substrates of failures in top-down control—have yet to be determined (Miller & D'Esposito, 2005). And third, how do individual differences in BAS/BIS strength influence choice and decision making? The use of neuroimaging techniques and experimental designs to elucidate the processes underlying human decision making has grown enormously in the past decade, with a complex picture emerging regarding the neural substrates of choice (O'Doherty and Bossaerts, 2008). Nonetheless, the role of individual differences in BAS/BIS strength within this important behavioral domain remains unclear. To some extent, this question is a reflection of the first two, but it represents a gap in knowledge that significantly impairs the application of psychological theory in domains such as psychopathology, education, and health.

There is some hope that our knowledge gap about individual differences in BAS/BIS strength can be addressed with modern neurobiological techniques. As is often the case, our understanding of very basic and normal processes comes from understanding pathological alterations of those processes. The ongoing studies of two pathological conditions are providing some insights that may allow us to understand how the normal set points of the BAS/BIS systems may vary among individuals. Neurobiological research about addictive processes has been instrumental in developing insights into reward (BAS)-motivated behavior. Likewise, studies of the spectrum of attention-deficit disorders are revealing genetically controlled variations in biological processes that affect both BAS and BIS functions.

Berridge and Aldridge (2008) have written a particularly accessible review of the brain mechanisms which underlie decision making in response to a potential reward, and how that decision-making process can be corrupted by pharmacological manipulations, such as exposure to the stimulant drug amphetamine. They describe how amphetamine-induced elevation of brain dopamine and other neurotransmitters can change the motivational state of the brain with regard to rewarding stimuli, and even cues to those stimuli. If we accept the proposition that pharmacologically elevated levels of dopamine (and/or other neurotransmitter) functions can alter motivational systems, then it is a small step to believe that endogenous modulation or genetically driven variability of those same functions might produce individual differences in motivational strengths and valences.

Studies of attention-deficit hyperactivity disorder (ADHD) are particularly relevant to this discussion. ADHD is almost certainly produced, at least in part, by alterations in normal functioning of the dopaminergic and related systems in the brain. Volkow, Wang, Fowler, and Ding (2005) reviewed the use of positron emission tomography (PET) to study human responses to the ADHD drug methylphenidate (Ritalin). This drug suppresses the reuptake of dopamine from the synaptic terminals, thus raising the level of dopamine in brain areas. Treatments with methylphenidate enhance the dopamine release which occurs in response to "rewarding" stimuli and make them

more "salient" to the individual. Thus, with higher dopamine functioning, stimuli that have relatively less salience to an individual will gain salience and consequently become more motivating. Could there be individual variability in dopaminergic function among individuals, thus leading some to assign greater motivating force to rewarding stimuli than other individuals?

Genetic studies have indicated that ADHD is a heritable disorder. This literature is briefly reviewed by Durston et al. (2008) and they present data implicating a particular dopamine transporter gene in ADHD families. Certainly others will be found, and certainly gene–environment interactions will be found to be important. So, for even this single transmitter system, there is abundant evidence that dopamine dynamics can regulate motivational processes, and a clear likelihood that there are genetic variations in mechanisms that regulate dopamine availability. Thus it seems quite likely that, even within the normal (nonpathological) spectrum, there will be profound differences in approach–avoidance behaviors that are based on the neurobiology of their motivational systems.

## Social-Cognitive Systems for Approach and Avoidance: Regulatory Focus Theory as an Exemplar

Social-cognitive models of goal-directed behavior emphasize the causal role of goal representations, as knowledge structures that develop and function in reciprocal interaction with the social environment to help people attain their personal goals (Cervone, 2000). Social-cognitive models of approach and avoidance behavior are typically described as theories of self-regulation, defined as the processes by which individuals set goals, select means to attain them, and assess progress toward them (Carver & Scheier, 1998). Following from Carver and Scheier's pioneering work on control theory, human goal pursuit is frequently characterized in terms of self-regulating feedback systems (Carver & Scheier, 1990), in which individuals have an active goal, assess their progress with respect to attaining it, and respond to the perceived discrepancy (or congruency). The concept of goal pursuit as a feedback system has been extended to avoidance behaviors, in which the intent is to distance oneself from an undesired outcome such as a feared or undesired personal characteristic (Markus & Nurius, 1986; Ogilvie, 1987).

In this section we explore one current social-cognitive model of individual differences in goal pursuit, regulatory focus theory (RFT; Higgins, 1997). Building on earlier distinctions (e.g., Bowlby, 1969, 1973; Higgins, 1987; Mowrer, 1960), RFT postulates (and distinguishes between) two coexisting regulatory systems that serve critically important but different survival needs. The *promotion system*, which develops in response to children's need for nurturance (Bowlby, 1988), relies on approach strategies when regulating toward desirable ends; that is, promotion goals involve "making good things happen." The promotion system is particularly active in the pursuit of ideals (aspirations,

advancement, and accomplishment). The *prevention system*, which develops in response to children's need for security (Bowlby, 1988), relies on avoidance strategies but also in the service of regulating toward desirable ends; that is, prevention goals involve bringing about desired end states by "keeping bad things from happening." The prevention system is particularly active in pursuit of oughts (fulfillment of responsibilities, duties, and obligations).

As will be discussed in greater detail below, the promotion and prevention systems are hypothesized to facilitate *strategic* rather than spatiotemporal approach and avoidance (Higgins, 1997). The strategic inclinations of the promotion and prevention systems can be conceptualized in signal detection terms (Tanner & Swets, 1954; Trope & Liberman, 1996). Individuals with a chronic or situationally induced promotion focus are motivated to ensure "hits" (gains) and to ensure against errors of omission or "misses" (nongains). In contrast, individuals with a chronic or situationally induced prevention focus are motivated to ensure "correct rejections" (nonlosses) and to ensure against errors of commission or "false alarms" (losses). There is now extensive support for the constructs of promotion and prevention, both as states induced by situational features and as chronic dispositions (Molden, Lee, & Higgins, 2008).

The different orientations of the two systems also result in distinct emotional experiences in the everyday pursuit of goals. For individuals who are typically in a promotion focus (or for individuals in whom a promotion focus has been induced via characteristics of the situation), success represents a gain—an instance of making something good happen—and results in cheerfulness-related emotions such as happiness, joy, enthusiasm, and satisfaction. In contrast, a promotion focus failure represents a nongain—an instance of not making something good happen—and results in dejection-related emotions such as sadness and disappointment. A different set of emotional experiences characterizes individuals who are typically in a prevention focus, or in whom a prevention focus has been induced. In this instance, success represents a nonloss (i.e., keeping something bad from happening), resulting in quiescence-related emotions such as calmness. In contrast, a prevention focus failure represents a loss (failing to keep something bad from happening) and results in agitation-related emotions such as worry, anxiety, and guilt (Higgins, 1997; Shah & Higgins, 2001).

Although the promotion and prevention systems are concerned with the regulation of different needs, promotion and prevention orientations each involve approaching desired end states (approaching accomplishment or safety, respectively) as well as avoiding undesired end states (avoiding nonfulfillment or danger, respectively) (Scholer & Higgins, 2008). This postulate has several important implications. Consistent with the view that the strength of orientation to promotion and prevention goals can vary as a relatively stable individual difference, the value or personal relevance of some desired end states may be greater in one system than the other. For example, individuals who tend to be in a prevention focus may value desired end states relating to keeping bad things from happening more than promotion-focused individuals. In addition, the same desired end state can be represented in different ways by prevention-oriented versus promotion-oriented individuals. The same desired end state or goal could be

represented as an ideal or aspiration by chronically promotion-focused individuals or as an obligation or responsibility for prevention-focused individuals.

As mentioned above, whereas BAS and BIS are hypothesized to underlie spatiotemporal approach and avoidance behaviors, the two systems postulated in RFT are hypothesized to enable strategic goal pursuit—"making things happen" (Higgins, 1997; Strauman, 2002). From an evolutionary perspective, BAS and BIS are likely to have evolved in animals to support adaptive responding to survival-relevant appetitive and aversive stimuli respectively. In contrast, the promotion and prevention systems reflect the more recent emergence among humans (and perhaps closely related nonhuman primates) of social interaction as the primary milieu in which survival needs are met. In this sense, self-regulation with a promotion versus a prevention focus involves a preference for using different strategies (e.g., Molden & Higgins, 2005). Also, whereas for BAS and BIS stimuli such as food or a predator would be relevant to only one system, according to RFT the same goal or desired end state can be pursued by promotion-focused and prevention-focused individuals but would be pursued using distinct strategies by these different kinds of people.

Consider two individuals who each have the goal to become successful scientists (i.e., two individuals who have represented as a personal goal the same desired end state). One of these two people is chronically promotion-focused, and so would prefer to use what might be called a "strategic approach" such as pursuing outcomes that are successively closer matches to the goal as well as pursuing outcomes that are successively greater mismatches to the opposite of the goal. According to the theory, promotion goals are best pursued in a state of eagerness, and there is consistent evidence that priming an individual's promotion goals (such as by incidentally exposing the person to stimuli that activate a goal-related knowledge structure) induces such a state (Shah & Higgins, 2001). The other of these two people is chronically prevention focused, and so would prefer to use what might be called "strategic avoidance" such as preventing mismatches to the goal as well as attaining matches to the opposite of the goal. According to RFT, prevention goals are best pursued in a state of vigilance, and prevention goal priming indeed increases vigilant behavior (Shah & Higgins, 2001). The eagerness-related strategies preferred by individuals in an acute or chronic promotion focus reflect concerns with advancement and accomplishment—their pursuit of ideals and growth. In contrast, the vigilance-related strategies preferred by individuals in an acute or chronic prevention focus reflect concerns with safety and responsibility—their need to prevent mistakes.

Recent research has begun to elucidate the neural correlates of promotion and prevention goal pursuit. Amodio, Shah, Sigelman, Brazy, and Harmon-Jones (2004) examined the associations between an implicit assessment of individual differences in regulatory focus (in that study, differences in reaction time to questions about promotion vs. prevention goals) and an EEG index of resting frontal cortical asymmetry. Their findings were consistent with the prediction that chronic promotion focus was associated with greater left frontal activity, whereas chronic prevention focus was associated with greater right frontal activity. Using an experimental approach, Cunningham, Raye, and

Johnson (2005) examined the interaction of motivational and cognitive processes by having participants make good–bad or abstract–concrete judgments about concepts during fMRI scanning. After the scanning session, participants rated the extent to which stimuli were good or bad and then completed a self-report measure of individual differences in regulatory focus. For good or bad judgments (but not abstract–concrete judgments), chronic promotion focus was associated with greater activation in the amygdala, anterior cingulate, and extrastriate cortex following positive stimuli, and chronic prevention focus was associated with activity in the same regions for negative stimuli. The same research group (Touryan et al., 2007) also used fMRI to study the impact of individual differences in regulatory focus on encoding of, and memory for, emotional words. They observed that activity in posterior cingulate cortex was greater when stimulus words were focus-consistent (i.e., positive for chronic promotion focus and negative for chronic prevention focus). The authors suggested that regulatory focus may influence how self-referential information is processed in memory, with potential consequences for social interactions.

RFT predicts that promotion and prevention goal representations can be activated via semantic priming. Our research group has been exploring the physiological consequences of goal activation using a number of dependent measures, including behavioral, hormonal, and immunological "downstream" markers (e.g., Strauman, Woods, Schneider, Kwapil, & Coe, 2004). In a recent study (Eddington, Dolcos, Cabeza, Krishnan, & Strauman, 2007), we used incidental semantic priming to examine patterns of cortical activation associated with promotion and prevention goals via functional magnetic resonance imaging. A sample of 16 healthy undergraduates were interviewed to identify their individual promotion and prevention goals as well as their characteristic strength of orientation toward the two classes of goals. Approximately two months later, the participants returned for an ostensibly unrelated fMRI study based on Kelley et al.'s (2002) investigation of self-referential cognitive processing. In the Kelley et al. study (which used a so-called "depth-of-processing" paradigm to investigate the neural correlates of explicit self-referential information processing), participants made judgments about how well a list of attributes described themselves or another person, how socially desirable each attribute was, or how many syllables the attribute had. Consistent with the behavioral literature, Kelley et al. found that the more that the question required a "deeper" level of information processing (as well as self-referential processing), the more a characteristic profile of cortical activation was observed.

We replicated their procedure exactly, with one critical exception: Unknown to the participants, the list of attributes used for the judgment tasks included their own promotion or prevention goals as well as those of several others. We predicted that the activation patterns observed by Kelley et al. (2002) in association with each judgment task would be found, and that incidental exposure to promotion and prevention goals would be associated with activation of the left and right PFC respectively across the judgment tasks. Our study replicated the task-related activations of Kelley et al.'s (2002) depth-of-processing analyses. More importantly, consistent with our hypotheses, an

area of left orbital PFC was activated during promotion goal priming across all four judgment tasks (peak voxel: x = −36, y = 40, z = −17; BA 11/47). In addition, we observed that the magnitude of activation in this left PFC region was correlated significantly with individual differences in strength of orientation to promotion goals, as assessed via the Regulatory Focus Questionnaire (Foerster, Grant, Idsen, & Higgins, 2001): $r = .63$, $p < .01$. In contrast, magnitude of activation at this site did not correlate significantly with orientation to prevention goals, or to individual differences in BAS or BIS strength as measured via the questionnaire. We did not detect right PFC activation associated with prevention priming in this study (but see below).

To our knowledge, this study provided the first evidence that priming of idiographically assessed promotion goals was associated with left PFC activation. Furthermore, the observed activation in response to promotion goal priming was statistically and functionally independent of the judgment tasks in which participants were engaged, suggesting a neural "signature" for promotion goal activation that may be detectable even if individuals are not intentionally or explicitly engaged in personal goal pursuit. The locus of activation was found in an anterior region of PFC that has been postulated to play a critical role in integrating outcomes across separate cognitive operations in pursuit of abstract, higher order goals (Miller & Cohen, 2001; Ramnani & Owen, 2004).

Taking a self-regulation perspective on vulnerability to depression, Strauman (2002) had predicted that depressed individuals would manifest an attenuated motivational response to promotion goal activation. To test this hypothesis, Eddington et al. (2008) examined the neural correlates of promotion and prevention goal priming in a sample of unmedicated adult patients meeting DSM-IV criteria for major depressive disorder (MDD) ($n = 22$) as well as an age- and gender-matched control sample of adults with no psychiatric history ($n = 14$). Using the same procedure (adapted from Kelley et al., 2002) as in the study reported above, Eddington et al. incidentally exposed participants to their own promotion and prevention goals embedded in a judgment task during fMRI scanning. Based on the postulate that depression is associated with hypoactivation in response to promotion goal priming, we hypothesized that MDD patients would show an attenuated lateral PFC (LPFC) response to promotion priming compared to the nondepressed controls (who, in turn, we would expect to replicate the LPFC activation found in the study described above). There was a significant difference in activation between the depressed and nondepressed groups following promotion goal priming, $t(35) = 2.53$, $p < .05$. The controls showed greater left anterior PFC activation following promotion priming than the depressed patients (peak voxel: $x = -16$, $y = 27$, $z = -11$; BA 11).

Consistent with our model, neither group showed significant activation at that site following prevention goal priming. However, as an initial test of the hypothesis that individuals with comorbid MDD and anxiety would manifest both attenuated responsivity to promotion goals and exaggerated responsivity to prevention goals, we then compared a subsample of five MDD patients with a DSM-IV comorbid anxiety disorder (four with generalized anxiety disorder, one with social anxiety disorder)

with a subsample of five age- and gender-matched patients with MDD only. We hypothesized that the comorbid group would show stronger right PFC activation in response to prevention priming compared to the depression-only group. We observed a region in right PFC (peak voxel: $x = 26$, $y = 40$, $z = -5$; BA 11) that was activated following prevention priming (compared to promotion), but only among MDD patients with comorbid anxiety. As in the earlier study, these activation patterns in response to promotion or prevention goal priming were detected even as patients and controls were responding to the different judgment tasks (e.g., number of syllables, describes a familiar other), providing evidence for neural "signatures" of normal and abnormal self-regulatory cognition.

As for our discussion of the role of BAS/BIS in approach and avoidance behavior, we wish to pose the question: What does it feel like when a promotion or prevention goal is activated? As summarized briefly above, RFT stipulates that there are particular emotional states associated with perceived success or failure in pursuit of promotion versus prevention goals. In addition, a related theory, regulatory fit, speaks to the experience of pursuing such goals. Higgins (2006) differentiated between the hedonic experience of perceived progress or lack of progress toward a personal goal and the "force experience" of attraction (toward an end state that has positive value) or repulsion (away from an end state with negative value). Within RFT, the hedonic experiences associated with promotion goals are joy and happiness or sadness and disappointment, whereas the hedonic experiences associated with prevention goals are calmness and quiescence or agitation and anxiety. Similarly, regulatory fit theory postulates that people experience a sense of "fit" when their goal orientation at any particular moment is being sustained by the manner in which they are pursuing a particular goal. An eager strategy sustains a promotion focus, whereas it disrupts a prevention focus. In contrast, vigilant strategy sustains a prevention focus, whereas it disrupts a promotion focus (Higgins & Spiegel, 2004).

Continuing to use RFT as an exemplar, what is the current state of knowledge regarding social-cognitive theories of approach–avoidance goal pursuit? Although RFT (along with similar theories) is somewhat newer than the BAS/BIS model, there is a substantial literature testing its predictions and supporting the theory's main postulates. Nonetheless, there remain a number of unanswered questions of particular relevance to this handbook. Three such questions appear to us to be particularly important from an individual differences perspective. First, although correlational data suggest that BAS/BIS and promotion versus prevention are at most moderately correlated, very little is known about whether they function independently, in parallel, interactively, or (depending on circumstances) all of the above. Published findings to date simply indicate that, in regression analyses, BAS/BIS and promotion versus prevention are nonredundant (e.g., Foerster et al., 2001). Without carefully designed experimental studies, it is not possible to elucidate the functional similarities and differences between the two sets of systems. Second, although the EEG and fMRI data summarized above suggest that regulatory focus may have distinct neural substrates from BAS and BIS, a more important question is to identify the neuroanatomic

pathways by which the two sets of systems can influence each other as well as executive control functions that oversee behavior. Again, only experimental studies designed to answer these questions can elucidate the neural bases by which each system operates. And third, assuming that the available correlational data are accurate, what would it mean (from an individual differences perspective) to have a characteristically strong BAS but not to be characteristically promotion-oriented (or vice versa)? Similarly, what would it mean to have a characteristically strong BIS but not be strongly prevention-oriented (or vice versa)? Studying such individuals, who according to available data would not be particularly rare, will be particularly useful for building a multisystem perspective on approach–avoidance characteristics and human personality.

## Biobehavioral and Social-Cognitive Systems for Approach and Avoidance: Toward a More Comprehensive Understanding of Human Goal Pursuit

Aristotle's prescient remarks about the goal-seeking nature of human behavior have been borne out by the past century of research. As even this limited review attests, behavioral science and neuroscience have amassed an impressive body of knowledge regarding the mechanisms that underlie individual differences in approach and avoidance behaviors. In this concluding section, we offer a set of generalizations based on that body of knowledge and suggest avenues for research that are likely to be particularly fruitful. Whereas both biobehavioral and social-cognitive perspectives postulate motivational systems that instantiate approach and avoidance behaviors, the two sets of systems appear to differ in several important respects. Those potential distinctions, in turn, highlight the value of multiple levels of analysis in the study of behavior.

Biobehavioral theories postulate that variability in neurally based sensitivities to evolutionarily defined stimulus classes provide the cross-situational consistency that is the hallmark of individual differences at the level of personality (Gable et al., 2003; McCrae & Costa, 1997). In that sense, biobehavioral models represent a perspective that begins with lower order processes (indeed, at least in some cases with the causal influence of fluctuations in neurotransmitter levels) and in which individual differences in goal pursuit are determined primarily by CNS reactivity to salient stimuli (Fowles, 1994). To the extent that the sets of stimuli relevant to the BAS and BIS can generalize through learning, these systems provide a powerful set of psychological mechanisms to account for individual differences in goal pursuit. Of course, it follows that one challenge for biobehavioral theory and research is to elucidate how temperament-based individual differences in approach and avoidance generalize to higher-order cognitive processes that underlie human goal pursuit behavior (Tomarken & Keener, 1998).

In contrast, social-cognitive models such as RFT presume that goal representations serve as primary organizing principles for goal pursuit behaviors (Cantor & Zirkel,

1990; Carver & Scheier, 2000; Higgins, 1990). Thus social-cognitive models provide a control process perspective (Carver & Scheier, 2000) in which the individual's personal goals, as knowledge structures, provide a coherent organization for perception, planning, and behavior (Austin & Vancouver, 1996; Pervin, 1989). Of course, social-cognitive models face a different conceptual and empirical challenge: how to account for the influence of higher order cognitive processing on basic motivational and affective tendencies.

It is unlikely that either level of analysis could ever provide a sufficient account of approach and avoidance behavior (Carver & Scheier, 2003; Depue & Collins, 1999; Mischel, 2004). Individual differences in BAS/BIS strength reliably predict behavior aggregated across situations, but typically manifest only modest associations with behaviors within specific situations (Kagan, 2003; Pervin, 1994)—with the notable exception that extreme situations (experimentally induced hunger, real-world situations with potential for violence) and pharmacological interventions show substantially larger effect sizes. Furthermore, relatively few studies of human individual differences measure BAS and/or BIS activation through physiological assessment, relying instead on more efficient but more distal questionnaire measures (Amodio, Master, Yee, and Taylor, 2008). In contrast, personal goal activation reliably predicts behavior in particular situations, but goals appear to be more variable over time than temperament-based personality traits and even in experimental situations goal activation is probabilistic rather than absolute (Caspi & Roberts, 1999). Although social-cognitive models have been more extensively studied using experimental designs, it is also the case that relatively few investigations have employed physiological measures to assess the consequences of goal activation. Of course, both spatiotemporal and strategic approach–avoidance mechanisms are highly adaptive (Cacioppo et al., 2000) and serve important survival functions. How, then, should these two sets of hypothetical systems best be conceptualized—as distinguishable manifestations of the same fundamental processes, or as correlated but distinct processes? We would argue for the latter but, more importantly, we wish to emphasize that there are critical unanswered questions preventing the field from attaining a comprehensive understanding of human goal pursuit.

One set of questions regarding biobehavioral and social-cognitive systems concerns the status of goals themselves, as knowledge representations with profound motivational and affective significance (Elliot, 2008). Some theorists have proposed that goal representations are part of the BAS and BIS themselves (Depue & Collins, 1999). For example, Derryberry and Reed (1996) proposed that the subcortical components of the BAS and BIS exercise a reciprocal influence on cortical regions associated with goal representations. Similarly, Tomarken and Keener (1998) noted that areas of the prefrontal cortex associated with approach–avoidance and positive–negative affectivity also appear to be involved in goal representation and goal-related cognitive processing. Still others have suggested that goals operate independently of the BAS and BIS. Rutter (1987) postulated that adult personality encompasses the social and cognitive elaborations of one's initial constitutional endowment, extending beyond temperament to include information and conceptual structures like self-concept and social

goals. Taking a more radical stance, Bandura (2001) proposed that goals and associated self-efficacy beliefs take on a primary causal status in determining the direction and consequences of behavior, such that the BAS and BIS are only indirectly associated with individual differences in goal pursuit. Across this range of opinion, it is clear that a comprehensive model of individual differences in approach and avoidance behaviors will require a clear understanding of how goals (and other motivationally significant knowledge representations) are involved in systems that influence the direction and intensity of behavior.

Another set of questions pertains to the extent to which the two sets of systems are synergistic, competitive, interacting, and/or inhibitory. Based on experimental findings in both neurobiology and psychology, it is clear that there are circumstances under which BAS/BIS and regulatory focus manifest distinct influences on self-regulation of approach and avoidance behaviors. For instance, much is known about the impact of pharmacologic agents on the reward and fear systems. Similarly, behavioral studies have shown that priming promotion and prevention goals has a predictable acute impact on task performance that is at least statistically independent of individual differences in approach–avoidance temperament (Foerster et al., 2001). The dominant view of BAS and BIS is that they are fundamental characteristics of personality because they represent two general systems for orchestrating adaptive behavior (Fowles, 1980). However, the social cognition literature suggests that promotion and prevention are not simply channels for expressing approach–avoidance temperaments; rather, they appear to reflect separate psychological mechanisms by which individuals seek to maximize positive outcomes and minimize negative ones (Higgins, 1997). We suggest, then, that the literatures reviewed above point to the existence of parallel, interacting sets of motivational systems, and that exploration of the conditions under which one system versus another dominates control of behavior would be of considerable theoretical and applied value. One set of systems is more closely tied to neurobiological mechanisms and variability (chronic as well as situational) in those mechanisms; the other set of systems corresponds to a general "worldview" (Higgins, 1997) and may be more removed from neurobiological variability and more influenced by social stimuli.

Recent research examining the relation between BAS/BIS strength and approach–avoidance goals offers a glimpse of the complexity of intralevel and interlevel system dynamics likely to be observed. Elliot and colleagues have conducted a series of investigations testing the hypothesis that approach and avoidance temperaments are associated with different kinds of achievement goals. They observed that individual differences in approach temperament (i.e., BAS strength) predicted both mastery and performance-approach goals, whereas individual differences in avoidance temperament (BIS strength) predicted both performance-approach and performance-avoidance goals (e.g., Elliot & Thrash, 2002). These findings provide compelling evidence that individual differences in BAS and BIS strength can be manifested in social contexts not obviously associated with the kinds of stimuli around which the reward and fear systems presumably evolved. However, the data also indicate that the

influence of BAS and BIS on goal pursuit may be mediated by goals and related knowledge structures—a pattern which, if validated, will require investigators to focus on multiple levels of influence.

Even if biobehavioral and social-cognitive mechanisms for approach and avoidance are correlated but functionally independent, should the two sets of constructs be organized into a coherent theoretical framework (Emmons, 1995)? One possibility is to hypothesize that BAS and BIS directly incorporate goal-directed cognitive structures and processes (Depue & Collins, 1999; Elliot & Church, 1997; Tomarken & Keener, 1998). From this perspective, the complexities of experimentally modeling individuals' interactions with their social environments results in underestimating the functional association between approach–avoidance temperaments and goals. Zuckerman (1991) proposed such a model of individual differences; however, that model makes a strong claim that could be refuted by evidence that individuals with a strong BAS also could manifest a dominant orientation toward prevention goals.

An alternative conceptualization is to postulate that BAS/BIS and social-cognitive systems represent functionally and evolutionarily distinct mechanisms within larger, multilevel "meta-systems" that regulate goal-directed behavior in humans (Carver et al., 2000). In this conceptualization, goals and related cognitive structures could have causal primacy as determinants of approach and avoidance behavior, even though approach–avoidance temperaments predate them developmentally and are more stable across the life span (Caspi & Roberts, 1999). Similarly, individual differences in the availability and accessibility of approach-related versus avoidance-related goals might, in turn, be influenced largely by underlying variability in BAS and BIS strength.

Such a multilevel meta-systems perspective could account more easily for instances in which individuals are characterized by a dominant approach temperament (i.e., a strong BAS) but also by a strong orientation toward prevention goals (or a dominant avoidance temperament but a strong orientation toward promotion goals). The reliable but limited associations between temperament and goal pursuit would be consequences of the influence of temperament on the socialization process (Manian, Strauman, & Denney, 1998). Because BAS/BIS strength and regulatory focus were functionally distinct, they would not be expected to manifest correlations greater than what was observed in the present studies or by Elliot and Thrash (2002). Approach–avoidance motivation and behavior would be determined by both sets of mechanisms, with the relative influences (independent and interactive) of the two levels varying as a function of situational factors (Cervone, 2000; Higgins, 1997; Mischel, 2004). The multiple-levels alternative would satisfy the constraints of evolutionary theories of personality, in that ontogenetically older and newer functions (both of which are clearly adaptive) could coexist and operate in parallel but be both neurally and functionally independent (Cervone, 2000).

There are as yet many unanswered questions regarding the functional associations between BAS/BIS and regulatory focus, as well as the hypothetical overarching meta-systems in which they could be embedded. For example, under what conditions do the two levels of analysis (i.e., biobehavioral versus social-cognitive mechanisms)

operate consistently or inconsistently? Is one level characteristically dominant in self-regulation, and under what circumstances might that functional dominance (causal primacy) shift? Might the characteristic dominance of one level over another represent another source of individual variability and/or developmental change? If promotion and prevention are not functionally associated with the neural systems for responding to reward and threat respectively, what brain systems support the "energizing" (Elliot & Thrash, 2002) or motivating functions they serve? Do mood and anxiety disorders reflect dysregulation within as well as across the broadly defined promotion and prevention systems (Clark et al., 1994), and can such disorders be triggered by dysregulation at the psychological level as well as at the neural level (Strauman, 2002)? We look forward to participating in what will surely be exciting and challenge research to pursue these and similar questions about humans as goal-seeking animals.

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# 21

# *Hypo-egoic Self-Regulation*

**Mark R. Leary, Claire E. Adams, and Eleanor B. Tate***

As interest in self-regulation has exploded within psychology and the other behavioral sciences in recent years, two different conceptualizations of self-regulation have emerged. In one view, self-regulation involves instances in which people consciously exert deliberate control over their own inner states or behavioral responses. So people who purposefully refrain from eating a second cookie, or force themselves to exercise, or try to manage their feelings of nervousness before giving a speech would be self-regulating. Often, the term "self-control" has been used to refer to these instances of deliberate and conscious self-regulation. A second view conceptualizes self-regulation more broadly to include nonconscious, automatic processes as well as conscious, controlled ones. Nonconscious, and even inanimate, systems can regulate themselves through cybernetic mechanisms that automatically make adjustments to bring outcomes in line with predetermined standards, just as a thermostat turns a furnace off and on to keep temperature within some specified range. Living organisms have many such systems that regulate not only homeostatic biological processes but also psychological ones, as when learned habits come to manage behavior automatically.

Whether one wishes to use the term "self-regulation" to refer solely to conscious regulation or to both conscious and nonconscious control processes is a matter of preference. Defining "self-regulation" depends on how one conceptualizes the *self*-prefix, which may mean either that the self is being regulated or that it is the entity doing the regulating. In any case, no one would doubt that psychological regulatory systems can operate either consciously or nonconsciously. Furthermore, evidence suggests that

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each type of regulatory process works best for certain kinds of responses in certain kinds of contexts.

Our focus in this chapter is on the question of how people turn deliberate, conscious self-regulation into automatic, nonconscious self-regulation. Often people recognize that they would be better off operating automatically rather than deliberately, yet they are not able merely to switch control of a thought, feeling, or behavior to an automatic system. For example, athletes may recognize that they would be better off performing a skilled action automatically yet have difficulty stopping themselves from monitoring and controlling the action consciously. Transforming a psychological control sequence from a conscious to an automatic one presents a bit of a paradox, however, because deliberately trying to stop conscious and purposeful self-control requires that people intentionally and consciously take steps to reduce the degree to which their behavior is being controlled deliberately and consciously. At the time those steps are taken, the individual is acting consciously and deliberately, but the ultimate self-regulatory goal is to reduce self-awareness and conscious self-control. We call instances in which people self-regulate by deliberately abandoning direct efforts to control their behavior *hypo-egoic self-regulation*. Instead of exerting willful effort to control themselves, individuals using a hypo-egoic self-regulatory strategy try to diminish the degree to which they consciously control their thoughts, feelings, and behaviors.

We begin the chapter by examining instances in which people typically find it beneficial to lower their self-awareness or reduce their conscious control over behavior—that is, to enter a hypo-egoic state. We then provide an overview of hypo-egoic self-regulation which we expand in separate sections that deal with ways in which people can decrease self-awareness on one hand and lower their abstract and evaluative self-thoughts on the other. These sections focus both on strategies that promote hypo-egoic self-regulation and on individual differences in the ease with which people can regulate hypo-egoically.

## The Benefits of Reducing Self-awareness and Conscious Control

Many theorists have distinguished between two fundamental systems that process and respond to information—one involving conscious, controlled processing and the other involving nonconscious, automatic processing (Bargh, 1997; Epstein, 1990, 1994). Much of the time, people act nonconsciously without any intentional effort or self-awareness, responding automatically and spontaneously without thinking consciously about what they are doing or how they are doing it. Particularly in cases in which behavior is effectively controlled by cognitive scripts (Abelson, 1981) or habits (Wood & Neal, 2007), complex behaviors can be executed with minimal conscious thought. People are certainly processing information about themselves and their worlds in such instances, but the neurophysiological processes that control their behavior are occurring outside of their awareness, and the actors are not consciously monitoring,

thinking about, or controlling their behavior (Bargh & Chartrand, 1999). At other times, people process and respond to information in a conscious and deliberate fashion, thinking consciously about themselves and what they are doing (Epstein, 1994). In such instances, people ponder what they are going to do, think about how they will do it, and monitor their behavior as they move toward a goal.

People alternate between automatic and controlled processing more or less continuously, perhaps thousands of times each day, and each process has benefits over the other when used appropriately. Using conscious self-reflection, people can deliberately and systematically weigh important considerations, plan in advance how to respond in a particular situation, search for relevant information in the environment (instead of responding to whatever is there), and try to override unwanted automatic impulses and emotions. However, conscious, controlled processes also have several drawbacks. They occur relatively slowly, process information serially, and require considerable attentional and cognitive resources. A person can think consciously about only one thing at a time, and efforts to attend to and control one's actions consciously can be easily derailed by distraction and cognitive load.

In contrast, nonconscious processing is much faster, may allow simultaneous consideration of many pieces of complex information, uses fewer cognitive resources, and avoids certain detrimental side-effects of conscious thought (such as self-generated negative emotions). However, nonconscious processes do not allow the systematic and careful consideration of relevant information, rarely take the long-term implications of one's actions into account, and may lead people to respond mindlessly to situational cues without considering important features of the situation (see Langer, 1991).

For maximum effectiveness, the regulatory process used should be matched to the requirements of a particular problem, task, or decision. Optimal responses in many situations can be nonconsciously mediated, whereas responses in other situations ideally require deliberate, conscious thought. Unfortunately, the two systems do not always engage and disengage as they should for optimal responding. People sometimes do not pay sufficient conscious attention to decisions or tasks that are best performed in a careful, controlled fashion, and at other times they think consciously about and try to control responses that should be executed automatically. Although both errors occur, our sense is that the latter is more common and a greater source of difficulties (Baumeister & Showers, 1986; Leary, 2004; Wegner, 1989). That is, people seem to be more likely to think consciously when conscious thought is unnecessary (or, worse, detrimental) than they are to fail to think about things that require conscious thought.

Although people may not always be aware of the fact that their mode of information processing—conscious versus nonconscious—is not optimally matched to current circumstances, in some cases they realize that optimal action requires less conscious attention and control. In those instances, people may desire to relinquish self-focused attention and conscious thought for one or more of the reasons described below.

### *Unwanted Thoughts*

People sometimes wish to rid themselves of useless, distracting, or disturbing thoughts. For example, people sometimes find themselves unable to pay sufficient attention to the current situation because they are preoccupied by unwanted thoughts. So students may have difficulty following a professor's lecture because they are thinking about the speeches they must deliver later, or employees may have difficulty focusing on a task at work because they are thinking about their marital problems.

Typically, trying to control one's thoughts through force of will—"I'm just not going to think about it"—is ineffective or, worse, leads to an increase in the frequency of the undesired thoughts. Even when people successfully control unwanted thoughts initially, deliberate self-regulation can ultimately backfire. Research shows that people who try not to think about a particular object or topic later show a rebound effect in which the suppressed thought becomes more accessible (Borton, Markowitz, & Dieterich, 2005; Wegner, Schneider, Carter, & White, 1987; Wenzlaff & Wegner, 2000). Clearly, using conscious tactics to control one's thoughts often does not work.

This postsuppression rebound effect may be involved in clinical phenomena that involve ruminative or obsessive thoughts such as depression, posttraumatic stress disorder, phobic reactions, and obsessive-compulsive disorder (OCD). For example, people who try to suppress thoughts about traumatic events experience an increase in the frequency of the disturbing thoughts. Interestingly, people with OCD show a particularly strong postsuppression rebound effect, suggesting that OCD may involve deliberate efforts to suppress unwanted thoughts coupled with an inability to do so (Tolin, Abramozitz, Przeworski, & Foa, 2002).

### *Unpleasant Feelings*

Negative emotions can be fueled by conscious self-related thoughts. Whereas animals that lack self-awareness react emotionally only to events in their immediate situation, human beings generate a great deal of emotion in their own minds merely by thinking about past and future events and by evaluating themselves in particular ways (Leary, 2007). The person who is worried about a test or interview that will occur next week, angry about an injustice that was done many years ago, or jealous because of unfounded imaginings about what his or her partner might be doing is fueling unnecessary negative emotions through conscious self-thought. A person who realizes the futility of these self-created feelings may wish to stop the evoking thoughts but be unable to eliminate them consciously and deliberately.

### *Conscious Interference with Automatic Processes*

Sometimes, people realize that their performance on a skilled task is compromised because they are "thinking too much about it"—that is, thinking consciously about an action that is best performed automatically. A great deal of research shows that attending to and trying to control a well-learned behavior can impair performance (Baumeister & Showers, 1986; Beilock & Carr, 2001). When a skill becomes well-learned and automatic, the separate components of the skill that previously required individual attention and control become compiled into a unified automatized sequence. After the sequence becomes automatic, devoting conscious attention to the behavior breaks the proceduralized control structure into a sequence of separate, independent components, each of which must then be executed separately (much like when the person was first learning them). As a result, an automatic, smooth, and effective action becomes controlled, awkward, and ineffective (Lewis & Linder, 1997; Masters, 1992).

### *Counterproductive Self-control*

The preoccupied thinking that occurs when people try not to think certain thoughts or perform undesired behaviors can lead to failures in behavioral self-regulation (Polivy, 1998). People who try to control certain undesired behaviors, such as overeating or substance use, may be more likely to experience difficulties regulating themselves (Wenzlaff & Wegner, 2000). For example, research suggests that trying to restrain one's eating is the best predictor of overeating (Herman & Mack, 1975; Polivy & Herman, 1985). Because efforts to diet may lead to preoccupation with food and episodes of binge eating, people sometimes regulate their eating more effectively if they give up strict control over their food intake and eat in response to internal cues rather than rigid diet plans (McFarlane, Polivy, & McCabe, 1999). Lowe, Foster, Kerzhnerman, Swain, and Wadden (2001) randomly assigned obese women to one of two treatments: restrictive dieting (encouraging food restriction in effort to lose weight) or undieting (teaching participants to give up efforts to diet, focusing instead on internal cues for hunger and satiety). After eight weeks of treatment, people in the restrictive dieting condition were more likely to engage in "counterregulatory eating" (eating more after an initial eating episode than if they had not previously eaten), whereas participants in the undieting condition ate less if they had just eaten. In other words, those who were not focused on strictly controlling their eating seemed to regulate their eating more effectively. In our terminology, hypo-egoic regulation was more effective.

A similar effect occurs when people spend too much time thinking about an easy or familiar task. Langer and Weinman (1981) showed that giving people time to think before answering a question about which they were very familiar (asking unemployed people in Boston what it is like to be unemployed in Boston) led to lower quality

answers than having them respond immediately and spontaneously. However, when the answer to the question was less familiar (what it would be like to be unemployed in Alaska), providing time for conscious thought improved performance. This effect may occur whenever people try to think about, plan, or rehearse answers that could easily emerge spontaneously with little conscious thought. Contrary to the old adage, "practice makes perfect," practicing responses that could be performed nonconsciously sometimes makes imperfect (Langer & Imber, 1979).

Under certain circumstances, conscious thinking may also impair decision making. For example, Dijksterhuis (2004) found that when people have too much information to consider consciously, they may make better decisions if they stop conscious thought entirely (by being distracted, for example) than if they try to think about the information. Similarly, Wilson and Schooler (1991) found that thinking about why one likes certain tastes reduces the quality of people's decisions about them. People regularly make choices and decisions nonconsciously and spontaneously with little or no conscious thought and, under some circumstances, these decisions are better than those that are made through conscious deliberation.

## Hypo-egoic Self-Regulation

In each of the cases just described, people may wish to change their attention, thoughts, feelings, or behaviors yet realize either that they are unable to make themselves think, feel, or behave as they wish through direct, consciously mediated self-control or that trying to deliberately control themselves is backfiring. How, then, can people turn off self-awareness, conscious thought, and deliberate self-control when needed?

As noted, *hypo-egoic self-regulation* involves efforts to change one's thoughts, feelings, or behaviors by deliberately abandoning direct efforts to control them. Ironically, intentionally taking steps to initiate thoughts or behaviors that will foster nonconscious, automatic processing requires conscious self-regulatory effort, at least at first. People must decide to think or behave in ways that will reduce the degree to which they consciously regulate their behavior (either now or at some time in the future) and implement deliberate strategies to do so. If they are successful, their behavior may come to be controlled by nonconscious and automatic processes, and the deleterious effects of conscious thought and self-control will decrease. Of course, if, in fact, conscious control is needed for a task, performance may be hampered.

Two factors appear to influence the degree to which a behavior is under conscious self-control. First, by definition, conscious actions involve conscious self-thoughts and so require that people are self-aware at the time. Thus an action may be rendered nonconscious and automatic, in part, by reducing the degree to which the person is self-aware and consciously thinking about it. Second, when behaviors are under conscious self-control, the person's self-relevant thoughts tend to include abstract and evaluative thoughts about goals and future outcomes. In contrast, when behaviors are

predominately under nonconscious control, people's thoughts, if they have any, tend to be focused on concrete, specific features of the current situation or their own actions.

As Figure 21.1 shows, hypo-egoic states occur if either self-awareness is low or self-related thoughts are concrete. The prototypical hypo-egoic state occurs when both self-awareness is minimal and the self-thoughts that do occur are concrete ("A" in Figure 21.1). For example, an experienced musician may perform a piece of music with few conscious self-relevant thoughts, and those thoughts that do occur will involve concrete actions such as turning the page. In area "B" of Figure 21.1, people may think about abstract goals or symbolic self-conceptions, but the intrusions of abstract self-thought are infrequent (i.e., self-awareness is low) and thus do not derail automatic behaviors or create undesired emotions. An occasional abstract, evaluative, or even existential thought is usually not too problematic. In area "C," people are highly self-aware, but their self-thoughts are concrete rather than abstract. When people are in a flow experience, for example, they may be thinking a good deal about themselves, but their thoughts focus on how to meet the demands of the immediate situation (Csikszentmihalyi, 1990). For example, a kayaker shooting through white-water rapids may be thinking about which way to go, but the thoughts are concrete and present-focused rather than abstract.

The hypo-egoic state closely resembles the state of cognitive deconstruction that Baumeister (1990, 1991) proposed arises whenever people successfully escape self-awareness. According to escape theory, this deconstructed state is characterized by three features involving a focus on the present moment, attention to one's movements and sensations rather than emotions and higher level thinking, and reliance on immediate rather than long-term goals (Baumeister, 1990). These features are perfectly consistent with a hypo-egoic state in which people are not consciously regulating their thoughts and behaviors, although we emphasize the centrality of lowered self-awareness and concrete, present-focused thoughts. Thus people can foster a hypo-egoic state by finding ways to minimize self-awareness or focus their attention on concrete thoughts about the present situation. In the sections that follow, we will speculate regarding

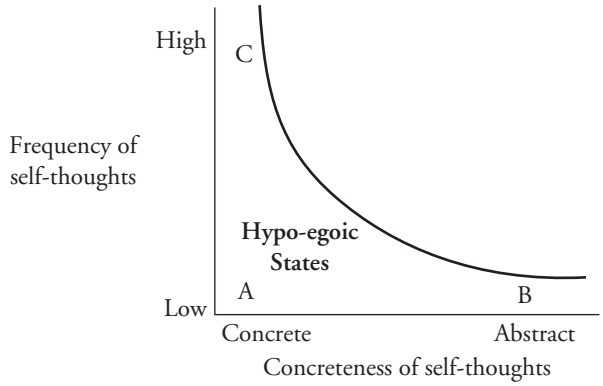


**Figure 21.1.** Hypo-egoic states.

ways in which people can intentionally lead themselves to relinquish deliberate self-control by reducing self-awareness and the abstractness of their self-relevant thoughts.

## Decreasing Self-awareness

In some situations—such as those involving deindividuation, intoxication, or transcendence—the proportion of time that people are self-aware may be relatively low, sometimes approaching zero for short periods of time. In other situations—such as when people are embarrassed, struggling with life-changing decisions, or under the scrutiny of a large number of other people—the proportion of time they think about themselves will be high. The question is: What steps can people take to reduce the amount of time that they are self-aware?

### *Repetition and Practice*

When people are first learning a new skill or even performing an old behavior under markedly new circumstances, they tend to monitor themselves closely and exercise deliberate control over their actions. Unskilled drivers, piano players, or dancers must control each action consciously, often guiding themselves with vocal or subvocal instructions, and their movements tend to be slow, awkward, and disconnected. Over time, however, repetition and practice can turn a conscious, deliberate, and effortful behavior into a nonconscious, automatic, and effortless one. Once a skill is well-learned, people no longer need to attend consciously to the component processes of the skill or to regulate the action consciously. In fact, research suggests that people who focus conscious attention during the learning stage of a skill and then intentionally try to maintain a "quiet mind" or be in the "zone" during task performance achieve better outcomes than those who do not maintain a quiet mind (Oliveira & Goodman, 2004). Thus one strategy for reducing the degree to which a behavior is consciously controlled is to automatize it through practice.

Fitts and Peterson (1964) suggested that people move through three stages as they practice a behavior. In the first stage, individuals who are learning a new task try out ways of performing the action, explicitly instructing themselves through self-talk. In the second stage, they consciously compare their current outcome with the desired outcome and purposefully modify their behaviors to enhance effectiveness. After these first two stages, the task has been "learned" but is not yet automatic. In the final stage, deliberate self-control is replaced by nonconscious, automatic processes that require little conscious attention and control.

Thus an individual who knows that excessive self-attention is interfering with performance of a skilled behavior might try to make the behavior as automatic as possible through repetition and practice. Not only does practice improve the person's

technique and increase automaticity, but it should also make the action less susceptible to disruption by conscious thought, distraction, and cognitive load.

### *Habit Formation*

Closely related to practice is the concept of habit formation. Habits are "automated response dispositions" that are triggered by features of the situation with which they have covaried frequently in the past (Neal, Wood, & Quinn, 2006, p. 198). Habits are perhaps the most ubiquitous example of hypo-egoic behavior. Nearly 50% of people's behaviors are habits that tend to be repeated in the same location almost every day (Wood, Quinn, & Kashy, 2002), usually with little conscious thought. Once a habit is formed, people can perform the relevant behaviors with relatively little planning, intention, or monitoring. In fact, people report that they often think about things that are irrelevant to their current behavior when they are engaged in habitual actions (Wood et al., 2002), indicating that habits do not require conscious monitoring.

Research shows that the automaticity that characterizes habits reduces the regulatory resources needed to perform a behavior. Wood and her colleagues demonstrated that when people respond repeatedly in particular contexts—such as in particular locations or at particular times of the day—the response becomes automated into a habit (Ouellette & Wood, 1998; Wood & Neal, 2007; Wood, Tam, & Witt, 2005). Then, after a habit is formed, contextual cues activate the habitual response automatically, with only limited exertion of conscious regulatory control required. As a result, habits can be maintained even when the person is tired, distracted, or ego-depleted because habit automaticity buffers performance from the effects of reduced regulatory resources (Neal & Wood, 2006).

We also find it interesting that habitual behaviors are less often accompanied by strong emotions than nonhabitual ones (Wood et al., 2002). In part, this pattern may reflect the fact that habitual behaviors and the contexts in which they arise are more mundane and predictable than those in which people behave nonhabitually. (Brushing one's teeth each morning is rarely an occasion for strong emotions.) But it also may be that habitual behaviors involve both a lower level of self-awareness and more concrete self-related thoughts (such as those focused on the mechanics of a habitual behavior) which, as we suggested earlier, are associated with hypo-egoic states. Furthermore, Wood et al. suggested that people view their habitual behaviors as less self-relevant than their nonhabitual behaviors, and thus habitual actions are less likely to evoke emotional content (Leary, 2007).

In any case, people who wish to inoculate a behavior, such as exercising or healthy eating, from disruptions may make efforts to turn it into a habit. Because habits are cued by the situational context, the key to forming a habit is to outsource behavioral control of a behavior to contextual cues (Wood & Neal, 2007). Then, once the habit is formed, the behavior may be initiated automatically by entering the setting in which the habit is usually performed, interacting with people who are usually present when one performs

the behavior, or completing the actions that usually precede the desired behavior. Although engaging in these kinds of actions to trigger the habit may require deliberate, conscious action, these initiating actions are often less effortful than trying to execute the desired behavior directly. Deliberately trying to execute or inhibit a habitual action is arguably more effortful than allowing it to be controlled by contextual cues.

### *Escapist Activities*

Because deliberately diverting mental attention away from oneself is so difficult, people sometimes resort to escapist activities that inherently prevent them from thinking as much about themselves as they normally would. People who wish to decrease their level of self-awareness may watch or play sports, go shopping, play video games, engage in exciting, engrossing activities (such as sky diving or rock climbing), have sex, and do other activities in which external stimuli absorb most of their attention, leaving little left over to devote to thinking about themselves. (The mindless appeal of "channel surfing" in which people repeatedly scan through television channels, pausing on each just long enough to register its content, may also reflect a tactic for reducing self-awareness.) Although many escapist activities are essentially benign, some tactics for escaping the self can be maladaptive. Baumeister (1991) suggested that behaviors as diverse as alcohol and drug use, binge eating, sexual masochism, and suicide may reflect efforts to "escape the self." (See also Hull, Levenson, Young, & Sher, 1983; Hull & Young, 1983.)

Escapist activities raise two interesting questions with respect to hypo-egoic self-regulation. First, to what extent are escapist methods of lowering self-awareness and quieting self-talk effective in reducing unwanted thoughts, feelings, and behaviors? They may often appear, both to the individual and to observers, as a decided waste of time or, worse, a dysfunctional vice, but they may reflect a beneficial way to reduce excessive self-awareness in ways that improve affect or performance. Research is needed on the positive and negative effects of escapist activities.

Second, do the regulatory effects of escapist activities on self-awareness and self-control carry over into other situations? Although we know of no evidence on this point, it seems possible that escapist activities lower self-awareness for a time afterwards. Thus a person who uses shopping, bungee jumping, or channel surfing to escape excessive self-reflection may have a quieter mind not only during the escapist episode but also for a while afterwards. Something about lowering self-awareness may break a cycle of excessive self-talk and leave the person temporarily less self-aware than he or she was beforehand.

### *Meditation*

A common theme in Taoist and Buddhist writings since ancient times is that people should undergo mental training in order to lower self-awareness and help them give

up trying to control themselves and their surroundings. Several chapters of the most important Taoist text, the *Tao Te Ching*, suggest that diminishing one's will so that one thinks and behaves more spontaneously is a key element of wisdom and success. Essentially, these teachings advocated fostering a hypo-egoic approach to life.

Although many methods of "quieting the self" were suggested in ancient Eastern texts, meditation was by far the most favored. Although meditation is used for a variety of purposes—as a means of lowering stress, reducing pain, or as a spiritual practice, for example—its primary psychological effect may be to lower the frequency of self-focused thoughts. The goal of many forms of meditation is to foster a mental state of alert, poised attention in which the person is totally present with few intruding thoughts about the past or about the future. When conscious thoughts occur during meditation, as they invariably do, the meditator lets each thought arise and dissipate without following it, judging it, or commenting on it mentally. Over time, meditation not only causes people's self-thoughts to decrease in both number and intensity but may also change the practitioner's response to those thoughts, allowing him or her to shift back to present-focused attention with greater ease after a thought has arisen. The person will still be pulled into self-conscious thought from time to time but eventually finds it easier to avoid following those thoughts that do arise, which lengthens periods of inner quietude. Importantly, meditation has long-term effects on fundamental attentional processes that persist even when the person is not currently meditating (Slagter et al., 2007).

Given that negative emotions are often evoked by self-reflection (Leary, 2004, 2007), meditation's effects on reducing self-awareness may lead people to have increased positive moods, experience less stress, and react to problems with greater equanimity ( Jain et al., 2007), although evidence regarding the precise effects of meditation on negative moods and emotions is mixed (Toneatto & Nguyen, 2007). Meditators also report greater clarity in their perceptions and thoughts, presumably because they are less preoccupied by thoughts about themselves, thereby freeing up attentional resources for perceiving the world (Slagter et al., 2007). Ironically, then, meditation seems to reduce the degree to which people consciously regulate their behavior and emotions, yet their behavior is often more effective and their emotions less labile, suggesting that automatic regulatory processes are operating more optimally.

Most research on meditation has examined its effects on emotions, physiological indicators of stress, and activity in various areas of the brain (e.g., Seeman, Dubin, & Seeman, 2003; Shapiro, 1982), but little work has explored whether, as we suggest, meditation also helps people to decrease self-awareness and conscious control when a hypo-egoic mode of regulating would be useful. The existing research on this question is mixed, with some research showing that meditation decreases self-awareness and rumination (Pekala, Wenger, & Levine, 1985; Ramel, Goldin, Carmona, & McQuaid, 2004) and other research showing that meditation increases self-awareness (Easterlin & Cardena, 1998; Page et al., 1997, 1999). In part, the contradictory evidence may reflect differences in how researchers operationalize self-awareness. For example, a person who attends closely to his or her breath or to physical sensations could

be said to be "self-aware," but this is not the sort of abstract, higher level self-attention emphasized in most theories of self-awareness and self-regulation (e.g., Baumeister, Heatherton, & Tice, 1994; Carver & Scheier, 1981; Duval & Wicklund, 1972) nor the sort of troublesome self-awareness that induces negative emotions and interferes with automatic behaviors.

### *Individual Differences in Self-Awareness and the Frequency of Self-Thoughts*

People differ in the degree to which they are self-aware and think consciously about themselves. Although this issue has not been examined directly, we suspect that people who think more about themselves have greater difficulty relinquishing conscious self-control and responding hypo-egoically when the occasion arises.

Perhaps the most widely studied disposition along these lines is self-consciousness. Two fundamental types of trait self-consciousness have been studied—private self-consciousness (the tendency to be aware of, introspect on, and think about one's internal states) and public self-consciousness (the tendency to think about the public aspects of oneself that are observable by other people; Fenigstein, Scheir, & Buss, 1975). Although private and public self-consciousness have somewhat different effects, they both involve a high level of self-awareness and self-related thought and thus are both likely to be inversely related to the ability to enter hypo-egoic states. Whether people are reflecting on their inner feelings, motives, and thoughts or are focused on what other people are thinking of them, they should have greater difficulty turning conscious control of their behavior over to automatic, nonconscious processes.

Importantly, analyses of the Private Self-consciousness Scale have identified the presence of two factors—inner state awareness and self-reflectiveness—which alerted researchers to the possibility that people may think about private aspects of themselves in at least two distinct ways (Anderson, Bohon, & Berrigan, 1996; Trapnell & Campbell, 1999). Inner state awareness involves paying attention to one's thoughts, feelings, and other internal states (e.g., "I'm alert to changes in my mood"), whereas self-reflectiveness involves ruminative and somewhat negative self-preoccupation (e.g., "I'm always trying to figure myself out"). In many ways, this distinction reflects the degree to which people's self-relevant thoughts are concrete and present-oriented versus abstract and evaluative. Thus we would expect that people who score high in self-reflectiveness would have greater difficulty entering and maintaining hypo-egoic states because they display a high level of self-awareness that is focused on abstract, evaluative aspects of themselves. Consistent with this possibility, research has shown that scores on the self-reflectiveness factor correlate with indices of negative affect and personal difficulties, including neuroticism, anxiety, shame, guilt, and low agreeableness (Anderson et al., 1996; Conway & Giannopoulos, 1993; Scandell, 2001; Trapnell & Campbell, 1999). In contrast, scores on the internal state awareness factor correlate negatively with negative affect and maladjustment. Even though people who score high

in inner state awareness are often self-aware, their self-thoughts tend to be concrete, present-focused, and nonevaluative—that is, hypo-egoic.

Several individual difference variables involve a high degree of public self-awareness that may also make it difficult for people to respond hypo-egoically. For example, social anxiety, embarrassability, shyness, and loneliness all involve a tendency to dwell on how one's appearance or behavior are being perceived and evaluated by other people (e.g., Bruch, Hamer, & Heimberg, 1995; Edelmann, 1985; Hope & Heimberg, 1988; Miller, 1996; Moore & Schultz, 1983). In each instance, thinking a great deal about one's standing in the eyes of other people keeps attention focused on oneself and leads to efforts to manage one's behavior in ways that result in desired reactions from other people. As a result, people who score high in social anxiety, embarrassability, shyness, and loneliness have great difficulty not thinking about themselves and hypo-egoically "going with the flow," particularly in social situations.

Of the so-called Big Five personality attributes, the one that might be most related to people's ability to regulate hypo-egoically is neuroticism (or, conversely, emotional stability). Although neuroticism is usually defined primarily in terms of negative emotions, it is also associated with a ruminative, worrying type of self-thought. To some extent, neuroticism and rumination are probably mutually and reciprocally maintained (Roberts, Gilboa, & Gotlib, 1998). If so, highly neurotic individuals might benefit from strategies that lower self-awareness and intrusive self-thoughts and thereby promote hypo-egoic regulation. Furthermore, because they worry about future events, people high in neuroticism may try to avoid negative outcomes by direct, willful action when, in many cases, they might experience less anxiety if they were able to trust habits, practiced skills, or other hypo-egoic techniques to guide them toward their goals.

## Lowering Abstract and Evaluative Self-thought

A second route to hypo-egoic self-regulation involves increasing the concreteness (or reducing the abstractness) of one's self-relevant thoughts. When people make unsuccessful attempts to control their thoughts, feelings, and behaviors, they often fail because they are evaluating or thinking about the implications of their behavior rather than simply focusing on the behavior itself.

Focusing on an action at a concrete rather than an abstract level may have at least three effects on self-regulation. First, it focuses attention on the demands of the present situation. For example, a college basketball player's thoughts about being observed by professional scouts may distract him or her from the immediate task of shooting the ball. Similarly, worrying about how others may evaluate one's performance may use cognitive resources needed for the task, as occurs in cases of test anxiety, social anxiety, and stage fright (Bond & Omar, 1990; Leary & Kowalski, 1995; Wine, 1971).

Second, concrete self-thoughts might lower, if not eliminate, anxiety and other emotions that interfere with task performance. Thinking broadly about one's goals, the

possible consequences of one's behavior, or the larger ramifications of whether one's actions will succeed or fail may induce anxiety or other emotions that interfere with the behavior in progress. A rock climber who is constantly thinking about falling may be too tense to climb safely, and an actor in a play who is worried about the audience's reactions may experience stage fright and forget his or her lines.

Third, concrete self-thoughts may require less effort and thus be less likely to deplete self-regulatory resources than abstract self-thoughts. Webb and Sheeran (2003) showed that participants who formed specific, concrete intentions for performing a task had more cognitive resources available and thus performed better on a subsequent task. Focusing narrowly on what one is doing here and now is often less cognitively taxing and depleting than cogitating about larger, abstract issues.

### *Action Identification*

Action Identification Theory (Wegner & Vallacher, 1986) suggests that any behavior may be described simultaneously at a number of levels. For example, a school teacher may describe what he or she does at work as "putting in eight hours," "teaching," or "promoting the development of the next generation of citizens." Lower level action identifications (e.g., "putting in eight hours") describe how to perform the act, whereas higher level identifications (e.g., "promoting the development of the next generation") express reasons for and consequences of the act in more abstract terms.

According to the theory, the optimal level of action identification for difficult, complex, or unfamiliar tasks is lower than for easy or familiar ones (Vallacher, Wegner, & Somoza, 1989; Wegner & Vallacher, 1986). In support of this hypothesis, Vallacher et al. (1989) found that lower levels of action identification are associated with better performance on difficult tasks. In addition, an individual's level of experience and expertise at a particular task helps determine the optimal level of action identification. For a person just learning to play golf, lower level action identification is needed (I will stand this way, I will keep my head down, I will grip the club in this way). For an experienced golfer, however, a higher level action identification (I will hit the ball 255 yards) may suffice. Although people tend to identify their acts at optimal levels, they sometimes identify their actions at a higher or lower level than is ideal for the task at hand. Particularly when stress or pressure is high, people may experience "identity inflation" in which they focus on unnecessarily high-level goals, which can impair their ability to act effectively. Novice golfers may focus on impressing their friends by identifying their goal broadly as "playing well" rather than concentrating on each component of their swing. Hypo-egoic states are often instances when action identification occurs at the lowest optimal level for task performance. Importantly, although low levels of action identification sometimes facilitate the attainment of goals in the present situation, they do not necessarily promote self-control in the long run (Fujita, Trope, Liberman, & Levin-Sagi, 2006).

### *Construing and Implementing Goals*

People's thoughts about their goals involve both abstract, high-level mindsets that focus on *why* an action is being performed, and concrete, low-level mindsets that deal with *how* an action is carried out (Freitas, Gollwitzer, & Trope, 2004). Mindsets are more abstract when people focus on why they should perform certain behaviors, and more concrete when people think about how they will perform these actions. Thus people can presumably foster hypo-egoic self-regulation by focusing narrowly and concretely on how they will execute a behavior rather than on their long-term goals or overarching purpose.

Along the same lines, Gollwitzer and Bayer (1999) suggested that people who are pursuing a goal engage in two different types of mindsets. The deliberative mindset involves the selection of goals, and the implemental mindset involves planning precisely how one will implement the focal goal. Deliberative mindsets involve abstract "goal intentions" (e.g., "I intend to reach goal x"), and implemental mindsets involve specific action plans for achieving goals ("When situation y arises, I will perform response z"; Gollwitzer, 1999, p. 494).

Once people form an implemental intention, they essentially give up conscious control over their behavior. When people have decided in advance when, where, and how they will behave under particular circumstances, goal-relevant situational cues automatically trigger specific goal-directed behaviors (Gollwitzer, 1999; Gollwitzer, Bayer, & McCulloch, 2005). However, if as they implement the behavior, people reconsider the reasonableness or feasibility of their goal or contemplate other goals, the implemental mindset will be compromised, possibly interfering with implementation of the behavior (see also Costanzo, Woody, & Slater, 1992). Gollwitzer (1999) referred to forming implementation mindsets as "strategic automatization"—a way to move behavior from conscious, effortful control to automatic control by situational cues. Research has demonstrated that automating behavioral decision making in this way insulates performance against fluctuations in regulatory capacity. Students who had formed implementation intentions were less affected by an ego-depletion manipulation (Webb & Sheeran, 2003).

In a similar vein, Kruglanski et al. (2000) distinguished between assessment and locomotion tendencies. When people are in an assessment mode, they contemplate the advantages and disadvantages of various goals and courses of action, looking for the right or optimal way to respond. Being in an assessment mode involves a good deal of abstract self-relevant thought. In contrast, when operating in a locomotion mode, people focus on performing the actions that will help them to achieve their goals, with little attention to alternative goals or ways of responding. Although people move in and out of assessment and locomotion modes as they plan and take action, individuals differ in their tendency to emphasize assessment versus locomotion. Based on the conceptualization of these dispositions, we suspect that people who are high in locomotion tendencies are more likely to initiate and perform actions

hypo-egoically, spending less time thinking about what to do and how to do it and more time taking concrete action.

Whether viewed from the standpoint of abstract versus concrete mindsets (Freitas et al., 2004), higher versus lower levels of action identification (Wegner & Vallacher, 1986), deliberative versus implemental mindsets (Gollwitzer & Bayer, 1999), or assessment versus locomotion (Kruglanski et al., 2000), these perspectives offer strategies for promoting the concrete, present-focused thoughts needed for hypo-egoic self-regulation. Mindsets that are concrete, involve low-level identities, have an implemental focus, and emphasize locomotion all involve attending to how to perform specific actions (rather than why) and thus avoid overwhelming the person with abstract, higher level, deliberative considerations.

### *Mindfulness, Concrete Thinking, and Present-Focused Awareness*

Another way to promote concrete thinking, and thus hypo-egoic self-regulation, is to focus one's attention narrowly on what one is doing right here, right now. Several approaches to promoting mindfulness have been explored but, at its core, mindfulness involves being completely absorbed in the present moment, with heightened attention to one's current environment and present behavior, and an attitude of acceptance and nonjudgment (Shapiro, Schwartz, & Santerre, 2002).

Typically, mindfulness programs involve cultivating mental perspectives that, in our terminology, promote hypo-egoic functioning, such as observing events and one's reactions to them with no evaluation made as to their "goodness" or "badness" (and thus little abstract self-thought); confronting each moment without preconceived notions, stereotypes, or expectations; relinquishing goal-directed behavior in favor of "just being"; perceiving how things are without resistance or denial; and recognizing and then releasing thoughts without following or mulling over them (Kabat-Zinn, 1990; Leary & Tate, 2007). These mental approaches lead people to focus on the present moment without judgment, which may lower negative internal commentary and allow them to strive toward goals and take each moment as it comes. One randomized, controlled trial suggested that mindfulness meditation decreases rumination and distracted thoughts while increasing positive states of mind (Jain et al., 2007). Additionally, those who are higher in trait mindfulness seem to fall prey to fewer cognitive failures that reflect cognitive overload, such as forgetting names, having trouble making decisions, or forgetting appointment times (Herndon, 2008). Thus mindfulness provides a recipe for reducing abstract self-awareness and fostering hypo-egoic states.

Clinical and health psychologists have successfully used mindfulness training to treat a number of psychological and medical problems, including anxiety, depression, stress, panic disorder, headaches, and pain (Kabat-Zinn et al., 1992; Kabat-Zinn, Lipworth, & Burney, 1985; Kabat-Zinn & Waldrop-Chapman, 1988; Segel, Williams, & Teasdale, 2001). However, mindfulness training programs are typically complex, multifaceted interventions that involve features other than mindfulness per se, such

as relaxation training and even aspects of cognitive-behavioral therapy. Furthermore, as noted, mindfulness itself includes a number of distinct elements, including helping people to maintain present-focused awareness, reduce judgment, attend to concrete aspects of their experience without abstract cognitive elaboration, and quiet down their extraneous thoughts. As a result, it is difficult at present to disentangle the separate effects of the various components of mindfulness on thoughts, emotions, behavior, and self-regulation (Leary & Tate, 2007).

Although no one has attempted to analyze the separate components of mindfulness per se, Moberly and Watkins (2006) studied the effects of thinking about events in a concrete, process-focused manner on emotional reactions to failure feedback. Participants who scored low versus high in trait rumination (the tendency to dwell on past events) were trained to focus either on the concrete details of events or on abstract considerations, such as events' causes, meanings, and implications. After a failure experience, participants high in trait rumination expressed less positive affect than those lower in trait rumination when they had been trained to think abstractly and evaluatively, but being trained to think concretely eliminated this effect. In other words, the typical relationship between excessive rumination and emotion was eliminated when people had practiced focusing on the concrete aspects of situations.

Individual differences in mindfulness may be associated with the ease and frequency with which people respond in a hypo-egoic manner. Presumably, mindful individuals are self-aware in the sense of focusing attention on themselves, but their attention is devoted to concrete aspects of their current experience in the present moment rather than on abstract thoughts and judgments about themselves. The dispositional tendency to be mindfully aware is associated with indices of psychological well-being, including lower anxiety, depression, hostility, and somatization, and greater vitality, optimism, life satisfaction, and positive emotions (Brown & Ryan, 2003). In our view, these relationships arise because, in being focused on the present moment, mindful individuals do not ruminate as extensively on past and future problems (see Ramel et al., 2004). Whether dispositional mindfulness is also associated with the ability to self-regulate hypo-egoically when desired is an important topic for future research.

### *Fostering Acceptance*

Much of the abstract rumination that interferes with hypo-egoic processes arises from people's unwillingness to accept their current situation. When people are dissatisfied with themselves or their circumstances, they tend to dwell on the problem, often at a high level of abstraction that does not necessarily help them to resolve their difficulties. Although analyzing facts about a situation is often very useful for planning courses of action, such problem solving has a limit, and people who continue to fixate on the problem may not gain additional benefit from expending effort on analysis. When people need to relinquish conscious control, nonacceptance constitutes a major barrier to "going with the flow."

In addition to mindfulness and meditation training, both of which tend to emphasize nonresistance to one's immediate situation, clinical and counseling psychologists have devised a number of approaches to promote acceptance. In these approaches, "acceptance" does not equate with resignation or "giving up." Rather, people learn not to resist and fight their problems forcefully, but to let answers and solutions arise hypo-egoically.

The earliest and most widely studied technique along these lines is paradoxical therapy, in which people are admonished to stop trying to control undesired behaviors (paradoxical intention), to view their problems in a more positive light (reframing), or even to make themselves perform the unwanted behaviors intentionally (symptom prescription; see DeBord, 1989). For example, paradoxical techniques have been incorporated into empirically supported treatments for generalized anxiety disorder (GAD), a psychological disturbance characterized by excessive, uncontrollable worries (Dugas & Koerner, 2005). For patients with GAD, attempts to avoid worrying (e.g., thought suppression) may lead to increased frequency of worries. Thus, within certain cognitive-behavioral approaches, therapists instruct patients to vividly imagine and focus on their worries. Essentially, exposure to worries helps patients to give up efforts to avoid worrying, thus reducing the rebound effect and helping them deal with their problems more effectively and with less anxiety. Paradoxical approaches have also been shown to be effective in treating an array of problems including depression, agoraphobia, juvenile delinquency, and speech anxiety (Ascher & Schotte, 1999; DeBord, 1989). In our view, the therapeutic effectiveness of paradoxical therapy resides in reducing people's efforts to control unwanted behaviors—that is, in fostering hypo-egoic self-regulation.

Acceptance and commitment therapy (ACT) and its nontherapeutic counterpart, acceptance and commitment training, are based on the idea that psychological suffering is often due to people's efforts to avoid problems and their causes, which leads to rumination, negative emotions, a loss of contact with the present situation, and failure to take the steps needed to deal with one's difficulties (Hayes, Strosahl, & Wilson, 1999). In fact, ACT explicitly makes the hypo-egoic assumption that trying to change difficult thoughts and feelings directly through force of will is often counterproductive. ACT teaches people how to approach difficult experiences differently rather than trying to eliminate them altogether. ACT has been effective with a wide variety of problems such as stress, depression, anxiety, and drug and alcohol abuse (Hayes et al., 1999). ACT appears to promote a hypo-egoic state that may improve actions that ought not to be controlled consciously at that time.

A related approach, dialectical behavior therapy (DBT), uses mindfulness and present-moment awareness to reduce people's efforts to change themselves through effort (Robins, Ivanoff, & Linehan, 2001). DBT is based on the notion that, in many instances, people behave more adaptively when they accept undesired behavior and situations rather than try to control them (Foertsch, Manning, & Dimeff, 2003). Although DBT has many effects, for our purpose here, it seems to decrease the frequency and increase the concreteness of self-thoughts, thereby fostering hypo-egoic regulatory processes.

## Conclusions

We should not be misinterpreted as saying that all behaviors should be regulated hypo-egoically or that people fare better when they respond automatically and nonconsciously rather than deliberately and consciously. Many actions require conscious attention and control at the time that they occur, and failures to regulate one's thoughts, feelings, and actions consciously when deliberate oversight is needed often result in dysfunctional lapses of self-control. Yet it is also true that trying to control behaviors that would occur more effectively and smoothly without conscious attention and deliberate effort backfires, resulting in undesired thoughts and feelings and less effective performance. Furthermore, thinking about situations that cannot be controlled may result in negative affect that is essentially useless in improving behavior or enhancing one's outcomes.

We have discussed several ways of minimizing deliberate self-regulation when hypo-egoic regulation would be better, some of them focusing on reducing self-awareness and others promoting the concreteness of self-relevant thoughts. In both instances, the irony is that instigating hypo-egoic processes initially requires conscious intent and self-control that must then be relinquished at some point in the process. In many cases, as when a new habit is formed, deliberate self-control tends to diminish naturally, whereas in others, it requires people to engage in behaviors such as meditation or paradoxical intention in order to lower self-awareness and self-control.

A great deal has been written, both in professional journals and in self-help books, about ways that people can exercise greater self-control over their eating, drinking, anger, undesired emotions, and other problematic behaviors. Far less has been said about relinquishing control over their actions, and we doubt that most people even consider the possibility that less self-control is sometimes better than more. A good deal of research is needed to understand how people can consciously, deliberately, and intentionally act in ways that decrease their conscious, deliberate, and intentional efforts to self-regulate.

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